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POPULAR MECHANICS

MAGAZINE

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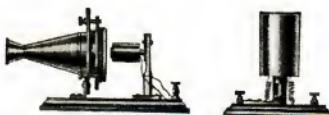
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October, 1934

Vol. 62, No. 4

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Flying the Spanish Main

SEVENTEEN-TON clipper ships today roar above the Spanish Main where yesterday pirate ships chased gilded galleons for gold. Nowhere else in the world do scheduled aircraft fly so fast, so far and so safely. In the olden days of terror, weeks were required to cross the Main. Now, on seven-league air boots, you can do it in a matter of hours. Sixteen pages of pictures in color in the November issue show you how aviation has conquered the Main and an article contrasts travel in the days of the freebooters with a journey in a clipper ship at two and one-half miles per minute.

Next Month

TODAY'S up-to-date service man does not depend on a monkey wrench and a "hunch" when he starts tinkering with your car. He uses such aids as neon lights to check ignition, an exhaust gas analyzer, frame straighteners, axle presses, wheel balancers and aliners and tracking gauges. An article in November describes the modern equipment for servicing your car.

Cooling with Steam

THE same steam plant which keeps your home warm in winter can keep you cool in summer. This "steam vacuum" system of refrigeration is cooling many New York skyscrapers and its simplicity, lack of moving parts, safety and economy make it practicable for the home. Read about the possibilities of this type of air conditioning in the next issue.

Some Queer Fish

THE Gulf of Mexico is filled with grotesque and mysterious creatures. For instance, there is the blow fish which inflates itself like a balloon to frighten its enemies, the cow fish with horns in front of its eyes and the porcupine fish with a protective coating of spines. In the November issue a writer who has caught many of these denizens of the deep tells you of the queer fish of the Gulf and their habits.

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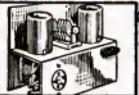
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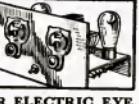
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Crayons 591

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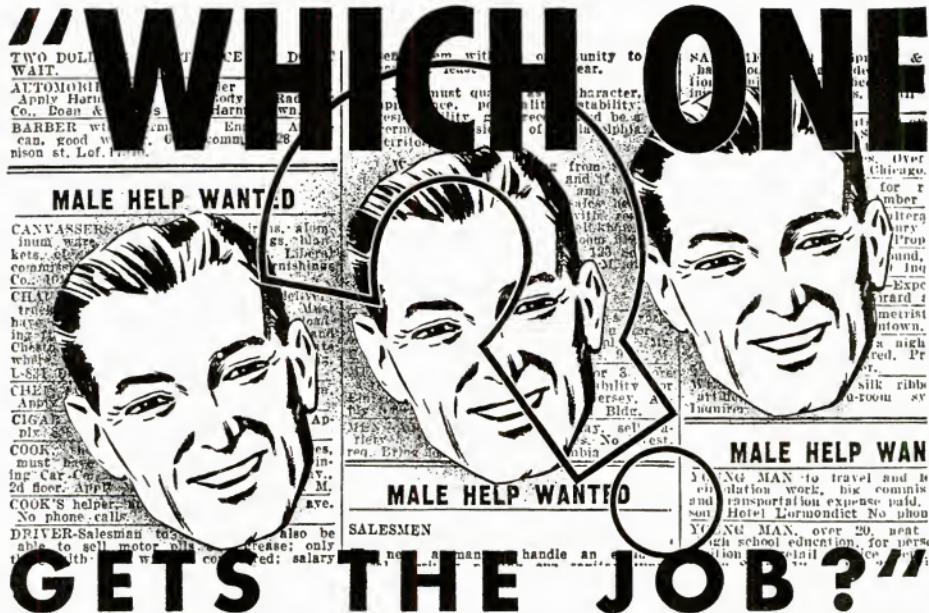
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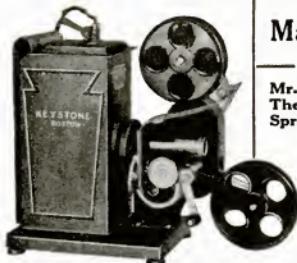
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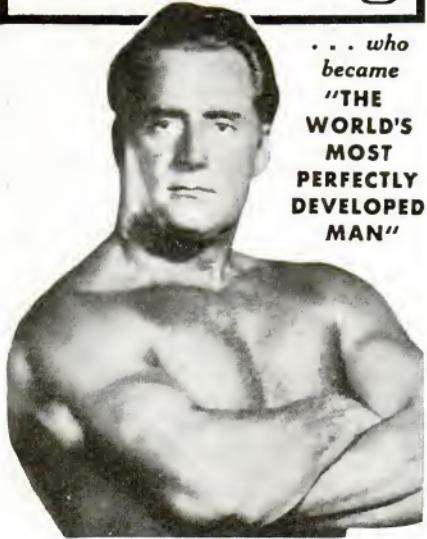
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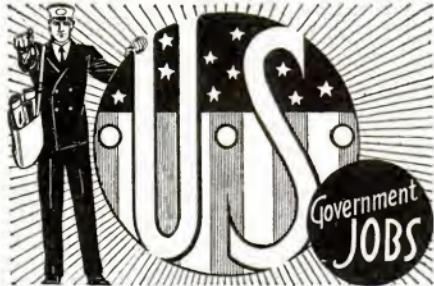
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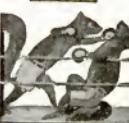


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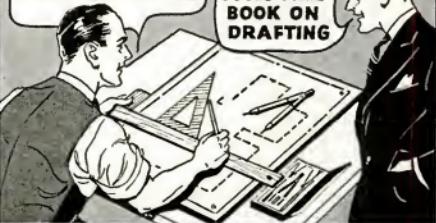
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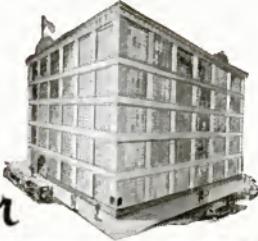
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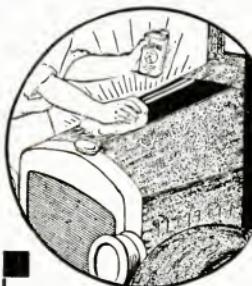
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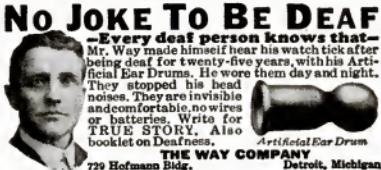
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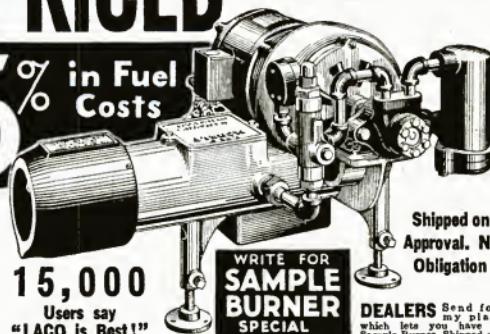
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FREE—New Advertisers Rate Guide, 44 pages. Includes everything. Lowest rates. E. H. Brown Advertising Agency, 140 S. Dearborn, Chicago.

FOR ADVERTISERS

24 WDS. Monthly-weekly combination \$4.98. Magazine free. Darnell, Jackson, Tennessee.

30 WORDS Printed 10,000 advertising circulars or name cards prospects \$1.00. Lee Agency, Sheridan, Ark.

ADVERTISE: 24 Words in 45 weeklies \$2.10. Goodall Adt. Co., Box 1592, San Francisco.

BLANK Gummmed "Multiplicity" addressing labels, \$1.00 thousand, postpaid, Milmarts, Cincinnati.

ADVERTISE: 24 Words in 250 newspapers \$10. Lists free. Advertising Service Bureau, 4650 Drexel, Chicago.

BUSINESS SERVICE

ENGINEER Will attend your Detroit business, purchase, promote. Confidential, \$1.00. Lavrov, 4368-W, Warren, Detroit.

INFORMATION

WHOLESALE Supply sources, half million items. Rush 10c. International Agency, Cincinnati.

DELAWARE Charters; fees small; free from Chas. Q. Guyer, 901 Market St., Wilmington, Del.

INFORMATION About Florida, dime. Nothing to sell. Write now. Al Watson, Bell Glade, Fla.

WHERE To buy anything—Manufacturers, wholesalers, 25c coin. King, 3223 Sixth St., Harrisburg, Penna.

WHAT Shall I be? Information service. Fred Klotz, Reading, Pa.

AUTOMOBILES

SPEED In Auto Racing. Brand new book gives all speed records; drawings, pictures, full description of cars. This year you can build 125-135 m.p.h. stock car and speedway racers. Midget, conversions, fully described. \$1.00 postpaid; \$1.12 C.O.D. Ray F. Kuns, Dept. B-2, Madisonville, Cincinnati, Ohio.

MONOGRAM Your automobile and personal belongings with distinctive Old-English gold initials. Six sets of initials, transfer liquid and directions \$1.00. Application simple; wonderful results. DuSeac, 2519 62nd Avenue, Cicero, Ill.

AUTOMOBILES—TRUCKS—Tractors can be equipped to burn low priced stove oil or number one or two fuel oil instead of high priced gasoline. Fuel cost reduced more than 50% in most localities. Complete instructions \$2.00. C. P. Peyton, 919 Market St., Klamath Falls, Ore.

BEAUTIFY—Identify your auto. Two sets of three gold initials with full instructions for applying sent for 10c. Novelty, 224 N. High, Albuquerque, New Mexico.

AUTOMOBILE SUPPLIES

EIGHT Semi-spiral expansion reamers \$13.45. Catalog. W. Barnhart, 1701 N. Third, Harrisburg, Pa.

MOR-LITE No-Glare bulbs make nightdriving safe. New light-ray control gives 100% more roadlight. \$1.00 pair. Yearly car, Chas. F. Minor, Jr., 2306 Lincolwood, Evanston, Ill.

PATENTED Paint striping tool, with wheels. Sensationally easy. Widths 1-1/2", 1-3/2", 1-6/8". \$5.00. Two sizes \$4.25. One size \$3.50. Scoles Inventions, 6701 Prospect, Kansas City, Mo.

PARTS: Passenger cars, trucks, tractors. Over ten thousand dismantled. Complete motors, transmissions, rear ends, clutches, or parts. No catalog. Write for literature. Unit Parts Rochester Corp., 1187 East Main Street, Rochester, N. Y.

PORTABLE Nickel plating outfit. Particulars free. Metalcraft, Louderman Bldg., St. Louis, Mo.

NICKEL Plating outfit, connect to your battery. No tanks used, thousands in use. \$3.00 prepaid. Gummetal Co., Ave. J. Decker, III.

AUTOMOBILE TRAILERS

BUY OR BUILD! We'll help! We manufacture couplers, chassis and full line streamlined trailer coaches with independent wheel suspension. We supply parts, blueprints and book of designs. Write today for free literature. Dept. D-2, Trotwood Trailers, Inc., Trotwood, Ohio.

AUTOMOBILE SERVICE EQUIPMENT

DEMONSTRATORS, Compressor, test bench, 8-hour battery charger—arc welder. Guaranteed. Trial before Ken's Equipment Exchange, Box M-1012, Troy, Ohio.

BARGAINS Used service station. Garage equipment. Fesco, 3117 Roosevelt, Chicago, Illinois.

MICROMETER: Measures outside every thousandths between 2 and 5 inches. Permanent accuracy guaranteed. \$1.00. Agents: Schasp, Laurelton, Long Island.

A.C. AUTO GENERATORS

TEN Practical and inexpensive changes concerning Dodge 12-V. Ford T. A. Chevrolet, Delco, etc. 100-125 volt, 100-150 ampere capacity a.c. generators, or into 32-110-volt d.c. motor or generator. Dodge is 500-watt self-excited. All in one book illustrated with complete simplified instructions and drawings for only \$1. Autopower, 408-B, S. Horne Ave., Chicago.

MOTORCYCLES, BICYCLES AND SUPPLIES

MOTORCYCLES \$25. New tires \$3.95, used tires \$2.50. Engines for airplanes, ice sleds, boats. Boys' automobiles \$10 to \$75. Pumps, dynamo, forks, handle bars, front fenders, handle bars, tanks, wheels, 2-speed assemblies, \$1.50. Wheels for airplanes, boys' automobiles, motorcycles \$1.00. Bicycles \$11.50. Motor bicycles \$15.00. Bike tires \$6. Save you dollars at Denlinger Price Cutter, Rochester, N. Y. Send 10c for price list.

PARTS. Send 10c for 24 page catalog. Including new and used parts for Indian, Harley, Henderson, Excelsior. Special prices on chains, batteries, accessories. Bootz, 622 E. Grand, Des Moines, Iowa.

BICYCLE Repair book—tells everything. Send 25c. Parts catalog free. A. H. Harwell Cycle Works, Dept. 104-K, 6267 Grand Street, St. Louis, Mo.

MOTORCYCLES—Direct to you at rock bottom wholesale prices. Builders, rodded and guaranteed Indians, Harleys, etc. Send 10c for "Bargain Bulletin 43." Cran dall Hill Co., 780 Commonwealth Avenue, Boston, Mass.

HENDERSON, Excelsior, Harley, Indian, used parts, alloy pistons, catalogue and wings. Box 180, Buffalo, N. Y. (12th floor), Louis, Mo.

MOTORCYCLE Bargains, lowest prices, bargain sheet for stamp motorcycle accessories, largest line in America, lowest prices. Largest motorcycle mail order house in the United States. Rochester Harley Davidson Corporation, 129 West Main St., Rochester, N. Y.

REPAIR With good used parts, save $\frac{1}{2}$ or more, state parts needed, no lists. J. B. Dahl, 3361 Archer Ave., Chicago, Ill.

SEND 15c for illustrated used Motorcycle catalog. Large stock. Bargains. Indian accessories. Indian Motorcycle Sales, Kansas City, Mo.

BATTERIES

EDISON Storage batteries for power and lighting systems, non-acid, non-corrosive. Five year unconditional guaranteed. One year life. Free illustrated literature. Plants, generators, etc. See Jay Battery Company, 22 Sterling Avenue, Yonkers, New York.

EDISON Storage batteries for all types of lighting systems. Uses no acid. Odorless. Long life. Guaranteed. Generating plants, motor generators. For interesting literature. Hawley Smith Company, 22 Washington Ave., Danbury, Conn.

AVIATION

AERO Blue Book gives specifications over 350 Airplanes from 40 to 7000 horsepower and nearly 100 aero engines. Also second-hand value popular ships. Priceless to students, engineers, dealers. \$1.00 postpaid, with choice "How to Choose a Flying School" and "Planning a Used Airplane" free if you order now! Alravit Distributors, 924 Pine St., St. Louis, Mo.

NEW AIRPLANES, \$98.00. Quality propellers, \$3.98. Photos, leather bound flying manual, 25c. Hibbs, Ft. Worth, Texas.

GET Into aviation. Air transport pilots get up to date, private mechanics, \$2,500. Learn at this government approved school. Write for complete information. State age. Lincoln Flying School, 2004 Aircraft Building, Lincoln, Nebr.

MODEL AIRPLANES

100 AIRPLANES. Repairable crackups \$30 up. Send 20c for Used Aircraft Directory. Athens, Ohio.

BOATS, OUTBOARD MOTORS, ETC.

PROPELLERS, Stuffing boxes, gear pumps, bearings, etc. Wm. Baker, Pond St., Quincy, Massachusetts.

CUT-TO-FIT Kayak, everything needed, \$5.95. Pictures for dime. Instructions for quarter, refunded with order. Boat Shop, Greenville, Pa.

FORD Propellers. J. Pettit, Seattle, Washington, 4325 Lakewood Ave., North.

12 FOOT Flat bottom boatboard complete plus 25c. Free boatbuilding catalog. The Rudder, 15 Murray Street, New York.

CARTOONING

SKETCH Or copy? Make money at home. Drawings, instructions 25c. "Burns," Somerville, N. J.

IF Interested sell your cartoons, sketches, write Paisley, 102 N. Broadway, St. Louis, Missouri.

CARTOON Students. Make real money. Definite plan. Something different. Bush Cartoon Service, 32 West Chippewa, Buffalo, New York.

LEARN Cartooning by new system. 225 illustrations and instructions—50c complete. Fraha Service, Cashton, Wis.

LEARN Cartooning—30 lessons, 500 illustrations, with drawing pens and pencils. Postpaid complete \$1.00. Scovell Studios, Box 116-P, Hollywood, Calif.

SELL \$1.00 for 100 lessons in theatrical shorthand and power lettering. Phil Grant, 223 Bennett Avenue, New York City.

CHALK TALKS

LAUGH Producing program, \$1.00. Catalog free. Balda, The Cartoonist, Oshkosh, Wisconsin.

BOOKS AND PERIODICALS

SEND Postcard for free Little Blue Book catalog. Thousands of bargains. More than 350 books at 5¢ each. Address: Little Blue Book Co., Box 2901, Girard, Kan.

PROTECT Your books with Silvers bookplates. Send for free samples and special offer. "Silvers," 6212 Glendale, Chicago.

300,000 **REFUGES**, Who's Who directory 25¢ coin. Trial 50¢ circulars mailed at \$1.00. E. Arnold, Box 64, Forked River, N. J.

MAGIC TRICKS AND JOKER NOVELTIES

250 TRICKS In magic 10¢. Hindu coin vanisher 10¢. Reeder, 104½ So. 4th St., Clinton, Iowa.

HERE'S the surprise of your life! A real man can make a woman disappear, or to different animal sounds; Japanese handuffs; a trick to tell people's age. This complete set only 15¢. Mystic Wiz Company, 1145-86th Street, Brooklyn.

FIVE Professional tricks and latest catalogue, 25¢. Frank Lane, 80 Boylston, Boston, Mass.

KIDS' BERRIES!! Nose blower 10¢. New shrinkie dancer 10¢. Menzel's, Oshkosh, Wisconsin.

FREE Magic catalog! South's largest line. Amaze—mystify your friends. Be popular. Earn money. Lyle Douglas, Station A-5, Dallas, Tex.

12¢ CARD Trick 25¢. Speizer Service, 1459 Van Cortlandt, Schenectady, N. Y.

FUN 11. Funny "Love Letters," 10¢. Stukes, 2112 Venus, Jacksonville, Fla.

MAGIC Catalogue 20¢. Lynn, 105 Beach, Dept. 3, Jersey City, N. J.

LARGE Professional magic catalogue, 25¢. Holden, 220 W. 42nd St., New York.

RADIO SETS AND SUPPLIES

RADIOS—World's cheapest. Sensation. No-cost sample. J-20th Century Co., Kansas City, Mo.

MICROPHONE 24K Gold buttons, complete with stand, \$3. Faas Research Laboratory, South Orange, N. J.

LARGE Professional magic catalogue, 25¢. Holden, 220 W. 42nd St., New York.

ALL-WAVE Farm, auto. Large catalog 2¢. Bart, Knoxville, Tenn.

ALL-ELECTRIC Table radios \$8.95! Auto radios \$19.85! Any make radio for less. Guaranteed! Write today. Fireside Royal Oak, Mich.

RADIO SETS, kits. Factory prices. Thirty models. Free catalog. Radio City Labs., 1217-39 Broadway Plaza, New York.

RADIO Experimenters and set builders. Parts and kits of parts for the auto radio. Little Giant and portable battery sets described by Popular Mechanics. Lund Mfg. Co., Dept. CO, 1730 Foster Ave., Chicago.

NEW Improved Melody King radio. No batteries or tubes, yet reception over hundred of miles reported. Postpaid \$1.00. Melomax, 77 Fairmount Station, Kansas City, Mo.

"POCKET Radio," \$2.15 C.O.D. Order immediately. Particulars free. Neil Tasker, Shamokin, Penna.

RADIO INSTRUCTION

STUDY Radio engineering in Washington. Modern laboratory equipment; trained instructors. Only advanced practical radio engineering course in America. One year residence course, home-study or both combined. Write for free illustrated catalog. Capitol Radio Engineering Institute, Dept. P, 11th and Park Roads, Washington, D. C.

RADIO Engineering, broadcast, aviation, amateur radio, service, marine and Morse telegraphy taught thoroughly. All expenses low. Catalog free. Dodge's Institute, Ames St., Valparaiso, Ind.

MAKE Simple tubeless radio. Crystal and instructions, 25¢. Melomute, 77 Fairmount Station, Kansas City, Mo.

LOW Power three tube crystal controlled code transmitter diagram 25 cents. Simple, inexpensive. No stamps. R. L. Bentley, White Deer, Texas.

FOR BOYS AND GIRLS

HARMONICA Instructor, 25¢. Play in one hour. G. Elsea, Bowling Green, Ohio.

NOVELTIES AND CURIOS

75 GENUINE Mexican jumping beans, 50¢; 200—\$1.00, postpaid anywhere. Nature's most perplexing curiosity. You can also see more details at 30¢; 825¢. Wright Specialty Company, 1031 South Broadway, Los Angeles, Calif.

BABY Turtles 1¢; pair 34¢; 100 10¢. Food 8¢. Beautifully painted 21¢; pair 40¢. Chameleons 40¢. Catalog 3¢. Smith Novelty Jobber, Miami Beach, Fla.

MAKE Big money making plaques, novelties, etc. Details free. Sample mold 25¢. White Display Supply Co., Studio, Dept. 19, 2105 W. 19th, Chicago.

STROBOSCOPE Complete with electric motor and neon lamp 81¢. Powerful spectroscopic shows sun's double sodium line, brilliant spectra of elements. New invention, \$2.50. Kutting Sons, Campbell, Calif.

STAMP COLLECTING

BETTER Grade stamp bargain. The old Kingdom of Sardinia issued its last postage stamps 75 years ago. These classics, beautifully embossed are now so scarce that many collectors have never seen any. We were fortunate to secure a few at London auction and often receive different expert copies together with the two highest values ever issued by Brazil, numbers 278—5000 reis and 299—10000 reis. Total catalogue value of these four stamps \$1.13. We will send all for only 10¢ to approval applicants. Global Stamp Co., 4th Ave., Dept. 50, New York, New York.

FREE Beautiful airmail and commem. stamps of Spain, Mozambique pictorials, Abyssinia prince Ras Tafarai now Emperor, Montenegro commem. Mosoleum of the Kings, Switzerland peace issue, Philippines, Salvad. Costa Rica, Russia, etc. Send 10¢ for list of pictorials and commem. Nicaragua, Nyassa. The entire lot free to approval applicants. Kindly send 10 cents for postage. Frasek Co., Lucerne, Switzerland.

RUSSIAN Murder set—5¢ to approval applicants. Merit Stamp Shoppe, Guilford, Connecticut.

U.S. Including commemoratives, 20¢. Wholesale Stamp Mart, Carroll, Iowa.

200 DIFFERENT, including 50 different British, with Fiji, Cyprus, Canadian commemoratives, 10¢ to approval applicants. Mantle Stamp Co., London, Canada.

NO Germany. Over 300 varieties. Lists. Approvals. 23¢. J. E. Taylor, Mart Bidg., St. Louis.

COMMEMORATIVES 10 Different free with envelope. Wollaston Stampco, Wollaston, Mass.

PENNY Approvals, that satisfy. Neil Grossman, Box 441-A, Philadelphia, Pa.

500 U. S. assort'd 25 cents, over fifty varieties, 1500 to 50 cents; 100 over 100 varieties for \$1.00. All by weight, unpicked, sold as received; commemorative; obsolete and current; precancels, etc. Premium fine foreign every order. Royson, Box 23, Southampton, N. Y.

1000 ASSORT'D U. S. 25¢; 100 commemorative, 25¢; 125 revenues, 25¢; 150 precancel, 25¢. Jewell, 1204 West Onondaga, Syracuse, N. Y.

BEST One cent approvals in America. E. Hand, 1117 St. So. 60th St., Philadelphia.

COLOSSAL Bargain! Packet North Borneo, Cayman, Zanzibar, Sudan, old United States commemoratives and multitude other fine stamps. Everything only 10¢ to approval applicants. Sterling, Box 725-M, Battle Creek, Mich.

SCARCE Indo-China and Paraguay airmails; pocket album, hinges, watermark detector, and big packet stamps, only 5¢ to approval applicants. Penny Stampco, 633P Maryland, Glendale, Calif.

GREECE 50 Different stamps of this interesting country, bargain at 10 cents to approval applicants. Anchor Stampco, Rutherford, N. J.

SKULL & Crossbones—Who'd think that a country would use this emblem of piracy on its stamp? Yet in 1914 Epirus issued some with this design. We enclose one of these in our special album of beautiful and odd stamps including the Balkan mountain issue for only 10¢ with approvals. Goldwater, 1827 Amethyst St., New York.

ALBUM Free—Spacious for 400 stamps, 2000 illustrations. Free to buyers of my approvals. F. Stern, 24-34 Chauncey St., L. I. City, N. Y.

SCARCE Iceland airmail triangle and fine pack of 65 different stamps including Java, India, Inini, French Colonies, savages, boats, airplanes, and animals stamps. Big illustrations. Only 5¢ to approval applicants. Potomac Stamp Co., 3708 13th Street, Dept. P, Washington, D. C.

CONGO! Unusual stamps. Babuundi natives, archers, weavers, etc. Six cents to approval applicants. References, Gordon Watson, Summit Avenue, Clifton, New Jersey.

11¢ Pictorial set 5¢ postage. Approvals. McCullough, 7027 Gillespie, Philadelphia, Pennsylvania.

LIBERIA Packet free to approval applicants. Welsh, Elsmere, N. Y.

SOUTH Sea packet—All mint—Direct from mid-Pacific; Altutak, Papua, Tonga, etc., 10¢ silver with amazing offer of free stamps. No approvals—Nothing to buy. List with valuable illustrations included. South Sea Imports, Box 1214, Luke Field, Honolulu, Hawaii.

FREE Set to approval applicants. ½ catalog. Stadler, Vinedale, N. J.

FOUR Mint sets (30¢ value) 15¢ to serious approval applicants. L. Hicks, 1007 Reed, Joliet, Ill.

MAGNACROCIOUS Gaiaxy—Ten scarce stamps 10¢ with foreign approvals. Swalley Stamp Co., 1119 Trenton, Los Angeles, California.

ZANZIBARI Packet queer freakish stamps from Zanzibar, Indore, Algeria, Malay States, Victoria, Goldcoast, Nigeria, British Colonies, Souamerians. Don't delay! Don't wait. This whooping packet free for 5¢ postage. Gray Stampco, Dept. PM, Toronto, Canada.

30 CANADA, 15 Newfoundland, 12 Ceylon, 13 Jamaica, 10 Trinidad, 15 Egypt all for 50¢. 100 British Colonies 20¢. Ask for approvals. British Colonies. Westminster Stampers, 5600 London, Canada.

TREASURE: 30 Different commemoratives 10¢. Begin, 48, Sous Le Fort, Quebec, Canada.

THIANGLE Stamps, 7 different 10¢ with approvals. Fort Dearborn Stampco, 5439 Aberdeen, Chicago.

500 Fine Mixed United States stamps with scarce cover, 25¢. Approvals. Wright, 1134 Hamilton, Hagerstown, Md.

WEIRD Flying Garuda with 100 different 5¢. Approvals. Burke, Marshfield, Vt.

BARGAIN, Stamp wallet and 175 precancel 5¢. Atlass, 128 Market, Newark, New Jersey.

CHEAPEST British and foreign approvals in Canada. Bennetto, 276 Launder Ave., Toronto.

1,000,000 RARE, Common singles, packets. A. Miller, 542 N. Ashland, Chicago.

FREE Bargain pricelist. U. S. revenues, 25¢ mixed, 25¢l Vanvoorn, Hyndman, Pa.

ECUADOR 15 Different 10¢ with approvals. Ephriam Stampco, River Forest, Ill.

MONGOLIA, Georgia, stamps from 50 other countries 5¢ with approval request. Ransom, 1333 Pontiac, Ann Arbor, Mich.

50 DIFFERENT U. S. commemoratives 3¢. Becker, 5657 Highland, St. Louis, Mo.

FREE: 5 Diff. Jamaica to approval applicants. Behrendt, Glastonbury, Conn.

FREE Triangle with 55 different, including Abyssinia, Malaya, Hyderabad, Madagascar, etc., with approvals. 5¢ Cresta Stampco, Box 2062M, Fresno, Calif.

ORIENTAL Covers, hand painted pictorially cancelled, 25¢; 6 different \$1. 100 U. S. all different high value packet. 50¢, 100 British colonies, \$1. Mercantile Stamps, Ventura, Calif.

LOOK! Gorgeous packet including Uruguay (Flying Horse), Spanish airpost, trigrams and ship stamps, only 5¢ to approval applicants. Royal Stampco, South Pasadena, Calif.

EARN Cash, stamps. Sell my approvals books. Ellisor, 2281 West 37th Street, Brooklyn, N. Y.

UNEATABLE Collection including airmails, Tanganyika, Rhodesia, South Africa, etc., with approvals. 5¢ Cresta Stampco, Box 2062M, Fresno, Calif.

SCARCE Paraguay, Graf Zeppelin airmail triangle, pocket album, watermark detector, packet stamps from Africa, Asia, Canada, South America, etc., 6¢ to approval applicants. Glendale Stamp Company, 1342P Linden, Glendale, Calif.

INVERTED Postcard 25¢. Hughes, 2563 Flower, Walnut Park, Calif.

UNITED States stamps on approval. Huber, 505 Hennepin, Minneapolis, Minn.

YOU'VE tried the rest, now get the best! We have answered all advertisements, compared premiums, approvals, etc., and absolutely proven that ours are superior. Send 10c for "Challenge Offer" with approvals. Barron Stamp Service, 1332 South Hope, Los Angeles, Calif.

UNITED States: World's lowest prices guaranteed! Box 114, Minneapolis, Minn.

FREE! Scarce triangle, packet handsome ship stamps, complete airmail set, watermark detector, lists and coupons—absolutely free for your postage! Approvals included. Midwood Stampco, Midwood Station, Brooklyn, New York.

FREE! Costa Rican triangle, Piccard balloon, 50 picturesque stamps to approval applicants. Send 3c postage. W. P. Stamp Co., 1427 Franklin Ave., Bronx, N. Y.

UNITED States: Mission 50¢; pound; 5¢ for \$2.00. Canada 50¢; 5¢ for \$2.00. Mission Company, 4512 No. 7th, Racine, Wisconsin.

MAGNIFIER. Stock book, stamp album, hinges, watermark detector, perforation gauge, millimetric scale, packet scarce stamps. Price 5c with approvals. Atlas Stamp House, Culver City, Calif.

SCARCE Morocco airmail, Eritrea camel money, 10c, 25c, 50c, 75c, 100c, 125c, 150c, 200c, 250c, 300c, 350c, 400c, 450c, 500c, 550c, 600c, 650c, 700c, 750c, 800c, 850c, 900c, 950c, 1000c, 1050c, 1100c, 1150c, 1200c, 1250c, 1300c, 1350c, 1400c, 1450c, 1500c, 1550c, 1600c, 1650c, 1700c, 1750c, 1800c, 1850c, 1900c, 1950c, 2000c, 2050c, 2100c, 2150c, 2200c, 2250c, 2300c, 2350c, 2400c, 2450c, 2500c, 2550c, 2600c, 2650c, 2700c, 2750c, 2800c, 2850c, 2900c, 2950c, 3000c, 3050c, 3100c, 3150c, 3200c, 3250c, 3300c, 3350c, 3400c, 3450c, 3500c, 3550c, 3600c, 3650c, 3700c, 3750c, 3800c, 3850c, 3900c, 3950c, 4000c, 4050c, 4100c, 4150c, 4200c, 4250c, 4300c, 4350c, 4400c, 4450c, 4500c, 4550c, 4600c, 4650c, 4700c, 4750c, 4800c, 4850c, 4900c, 4950c, 5000c, 5050c, 5100c, 5150c, 5200c, 5250c, 5300c, 5350c, 5400c, 5450c, 5500c, 5550c, 5600c, 5650c, 5700c, 5750c, 5800c, 5850c, 5900c, 5950c, 6000c, 6050c, 6100c, 6150c, 6200c, 6250c, 6300c, 6350c, 6400c, 6450c, 6500c, 6550c, 6600c, 6650c, 6700c, 6750c, 6800c, 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ANY Formula 30¢ or money back. Ogg Laboratories, Tampa, Florida.

500 MONEY MAKING formulas 25¢. Descriptive circulars free. Harvey Teeple, Decatur, Ind.

TWENTY Late money-making formulas, 20¢, brings all! International Agency Cincinnati.

GUARANTEED Formulas, best science can produce for making popular, biggest-selling specialties all lines. Don't buy formulas until you've received valuable eye-opening literature. Miller, Chemist, 706-7 F Jetton, Tampa, Fla.

FORMULAS, Plans, ideas. Literature free. Belford, 4042 N. Keefer, Chicago.

SUCCEED With your product. Learn how. Formulas. Processes. Analytical Service. Catalog free. B. Thaxby Co., Washington, D. C.

TESTED Formulas—Newest, guaranteed! Catalog free. Grinstead Laboratory, Edgewater, Ill.

FOMULAS. All kinds. Guaranteed. Catalog free. Kemco, 31, Parkridge, Ill.

CHEMISTRY

HANDBOOK For chemical experimenters (revised 1934). Illustrated, 50c. Experiment book 13c. Catalogue 10c. Reading Scientific Publishing Co., New York.

CHEMISTRY Magazine. Experiments, handbook, research. Sample 15c. Browniee, 218 Henry, New York.

ENJOY Thrill of chemist and magician. Lead in science. Send 25c for book with 130 fascinating chemical experiments. Chemists at low prices. Chemist, New Haven, Conn.

FREE! "Sciencecraft" magazine and other valuable scientific literature. Send stamp for copy and details. "Sciencecraft," P-5049, Berard, Chicago.

NEW Pocket chemical outfit including chemicals, test tube, supports and platform. Experiments, free. 50c. Kemek, 132 West 14th Street, New York.

CHEMICALS. Laboratory glassware and apparatus. Catalog CP. Biological Supply Co., 1176 Mt. Hope Ave., Rochester, N. Y.

AGENTS WANTED

BEAUTIFUL Foliow window sign letters. Penny each. Popular sizes. Easily applied. Samples sent free. Write for details. Free. Atlas Sign Works, 7341 Halsted, Chicago.

SELL. Changeable signs to stores. Six lines, 260 letters and figures. Cost 30¢ each for \$1.50. Free particulars. National Sign System, St. Louis, Mo.

100% PROFIT In the mystery cigar lighter. No cost to you. What makes it light? No wind can blow it out. Retail 25c. Sample and sales plan 25c. New Method Company, Desk PM-22, New Method Building, Bradford, Pa.

STRANGE Ironing cord. Prevents scorching. Saves electricity. Abolished static. Starts with a spark by Good Housekeeping. For telephones also. 140% profit. Samples furnished. Neverlast, Dept. 10-A, 4503 Ravvenswood, Chicago.

ORDERS, Repeat orders, good income assure workers. Kaesemann, Box 833, Lawrence, Mass.

NO Competition! Sell beauty, barber shop, agents. Free offer. Henkle Co., P-420 Lexington Avenue, New York.

BE Independent. Own your business; experienced unnecessary, selling \$10,000 accidental death, \$50 accident; \$25 sick weekly benefits; \$100 life. Other plans, proposition. Guaranteed trade, ready to start. Income, \$25,000 deposited insurance department, Universal Policy, 716-A Leffourt Building, Bronx, N. J.

MECHANICS—Make \$1.00 an hour, assembling Thresher Bench Cabinets at home. Plan 5c. Free literature. Page Mfg. Co., Dept. C, Liverpool, N. Y.

200% PROFIT Selling new "20-in-1" kitchen utensil. Returns 25c. Costs you \$1.00 a dozen. Sample 10c. New Method Co., PMM-22, Bradford, Pa.

DISTRIBUTORS: Represent a manufacturer. Sell Lath, selling bandage that breathes. Great demonstrator. Lowest prices. 400% profit. Good repeater. Exclusive territory. Neway, 3315-H Harrison, Chicago.

\$6.00 HOURLY. Amazing Karno refinishes autos like new without rubbing, polishing, waxing or painting. Works with others. Pay \$1 to month. Free sample. Karno, Dept. B-103, Cincinnati, Ohio.

NEW Changeable signs sell to stores for 75¢. You make 200% profit. Particulars free. National Sign System, St. Louis, Mo.

MONEY In household items. Vel-A-Tex, perfect hand soap. Chlor-A-Tex, ideal laundry bleach. Make and sell them. Manufacturing equipment, building plans free. Rain water materials, containers, labels at wholesale. Liberal samples, proposition, ten cents. Chemoplate Company, Bloomfield, New Jersey.

INITIALING Automobiles biggest money maker today. New type requiring no varnish to apply. Write for samples. International Mailers & Transfer Co., Box 6365, Philadelphia, Pa.

REGULAR Income, home, office, no canvassing. McArthur Co., Des Moines, 5, Butte, Mont.

CHRISTMAS Card salespeople. Absolutely finest assortment. Let us prove. Rush postal. Robinson Greetings, Clinton, Mass.

\$50.00 WEEKLY. Sell 5 glasses California orange jelly, 25¢. 200% profit. 5 glass sample 25c. Cutler-Clarke, 5151M Ruthelen, Los Angeles, Calif.

LOCAL Agents wanted to wear and demonstrate free suits to friends. No canvassing. Up to \$12.00 a day easy. Experience unnecessary. Amazing demonstrating equipment, actual samples free. H. J. Graves, Pres., 1301 Harrison, Dept. K-817, Chicago.

SALES Kit free. Write for our free offer and catalog of household deals, cosmetics, extracts etc. Many big names. Your friends and neighbors. Clyde Collins Chemical Co., Dept. PM-9, Memphis, Tenn.

1900 BEST Sellers, blades 65¢ hundred, needle books 25¢ dozen. Free wholesale catalogue. Paty Company, 5P Elston, Somerville, Mass.

100% PROFIT. Sell beautiful new 1934 Christmas card \$1. Assortment. Also gift wrapping, everyday, birthday boxes. Samples on approval. Schwer Co., Dept. 410N, Westfield, Mass.

AGENTS Wanted. Men and women can make good profits selling new attractive office specialty. Pleasant work with splendid possibilities. Mrs. S. St. Paul, Inc.

BEAUTIFUL Imported oriental slippers. Big sellers. Send 65¢ for sample pair and proposition. American Specialty Company, 424 South Broadway, Los Angeles, Calif.

SURE Fire seller—first time in America—laughs galore—unusually quick profits. Be first in territory. Free circular. Write New National, 161, Brookline Avenue, Boston, Massachusetts.

AGENTS—New discovery needed in every home, sells on sight, 100% profit. Sample 25c. Box 705, Oxford, N. Y.

CHRISTMAS Cards—21 card assortment sells fast 60¢. Send 30¢ for sample box, or individual from New England Art, North Arlington, 56, Mass.

\$2.00 HOURLY With amazing invention. Old odds made like new in five minutes. 6¢ a pair; not a polish or dye. Free sample. Sav-A-Upper, Dept. B-227, Cincinnati, O.

\$2.00 HOURLY With new, scientific cream that mends all clothes easily, quickly. Invisible mending, mends and threads. Stands laundering. Free sample. See-No-More Co., Dept. B-744, Cincinnati, O.

MAKE Your own products. Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Cleaning Laboratories, 1950W Broad, Richmond, Va.

INSTALL—Sell Haling's 4 piece piston rings. Restore power, save oil without re-boring. Haling Co., Rochester, Minn.

WOULD \$1.50 an hour satisfy you? Then send me your name immediately. I'll give you a wonderful opportunity to earn \$150 or more a day in home-operated business. Particulars free. Albert Mills, 4670 Monmouth, Cincinnati, O.

OUTSTANDING Easy selling products. No competition. Sample 10c. Mint Co., Baroda, Mich.

BIG MONEY. Sell 21-folder Christmas \$1 gift sets. 100% profit. Everybody buys. Also gift wrappings, etching, everyday, humorous, religious boxes. Extra bonuses. Free sample offer. Wallace Brown, 225 Fifth Ave., Dept. 310, New York.

NO Competition, big profits, sure repeats. Excellent new 140-hour guaranteed electric bulb. Open territories. Hanover, 32 Union St., New York.

PROFITS On new goods. Make sell them. Guaranteed formulas. Special prices, leads. Catalogue free. Gibson, Chemist, B D 4762 N. Racine, Chicago.

NEW Transparent day and night signs, 8x12, cost 1¢, retails 25¢. Sample signs. Clean up! Lowz, 8 West Broadway, New York.

MARRIED Man with spare time to distribute free samples coffee, flavoring, food products and make customers. Must devote at least 8 hours daily and be satisfied with \$10 to \$15 in home. Permanent. Blair, Dept. DFS-16, Lynchburg, Va.

MAKE Dazzling glass name plates; Sun-fector Daylite signs. Write. Rapid Service, Edwardsville, Ill.

BIG MONEY selling to trade! Unbreakable socket wrenches, valve grinding machines, drill presses. Stamp reply. Howard's, 2417 N. Ashland Ave., Chicago.

"CLOTHESLINE Clamps," dozen 75c. O K Line Lock Company, Toledo, O.

SELL Made to measure raincoats. Outfit free. Goodyear Rainwear, 18 West 22nd, New York.

EARN Money at home. Easy dignified proposition. No canvassing. Hetzel, 802 Garden, Hartford, Conn.

SELL Ink-up in school, home and office. Fill fountain pen without soiling pen or using side lever, other valuable features. Sample and selling plan 35 cents. Universal Specialty Co., Mukwonago, Wis.

MAKE More money selling shirts, ties, underwear, dresses, hosiery, raincoats, sunsuits, coveralls, pants, uniforms. Outfit free! Niarod Company, Department 8, 4922-28 Lincoln Avenue, Chicago.

SELF-THREADING Needle packages. Sample 10c.. Wm. Oglesby, Vandala, Ill.

MAKE Money selling our Indian remedies. Great repeat business, write for free booklet. Choctaw Medicine Co., Pontiac, Mich.

NEW \$30.00 Value, radio given in "free deal." Starts up to \$100.00 weekly. New sales plan. Also auto radios. Meritone Mfg. Co., 2837 North Hamilton, Chicago.

100% BARGAINS Drygoods, notions, toiletries, rubber goods. Agents undersell stores. Free catalog. Jobbers, Z-504 S. Crawford, Chicago.

STERLING Photo ring. Big profits. Photo medallions and jewelry novelties. Send for our latest catalogue. Medallion Novelty Co., Inc., 208 Bowery, New York, N. Y.

FREE Literature describing many money making plans. Belfort, 4042 N. Keefer, Chicago.

MAKE Money. Collect \$5, keep \$4. Two quick selling dollar per month "hard times" life policies. Write the Fidelity Mutual Benefit Association, Rockford, Ill.

SUCCEED With your products. Learn how. Formulas. Processes. Analytical service. Catalog free. B. Thaxt Co., Washington, D. C.

EVERYWHERE. Experience unnecessary. Learn how. Work & Financial Adviser, Valley City, N. Dak.

CASH Income daily resilvering mirrors at home. Replacing autoparts, tableware, etc. outfit furnished. Write Sprinkle, Plater, 128 Marion, Ind.

OPERATE Home mail order business, selling our products. Everything furnished. Superior Specialties, Springfield, Ill.

AGENTS: Smash go prices! Santos coffee 1lb. 45¢, vanilla 85¢, sugar 3¢, sonic 14¢, 60¢. Glass 10¢, perfume 10¢, 100¢, 200¢. Gum 12¢. Christmas cards 21 in box, 14¢, 150 other bargains. Experience unnecessary. Write Carnation Co., P.O. St. Louis, Missouri.

MAKE Products yourself—Tested formulas. Catalog free. Grinstead Laboratory, Edgewater, Ill.

AGENTS—Engraved name plates, number plates, signs, etc., easily sold, profits large. Brett Bros., Winthrop, Mass.

PORTFOLIO Agents throughout the world, get my free catalog, portraits, frames. Lowest prices. Picture Man Friedman, Dept. 9, 523 Cornelius, Chicago, Ill.

BIG Money applying gold initials on automobiles. Easiest thing today. No experience needed. Free samples "Raldo," 1984 Washington, Boston, Mass.

MAN It's time to plate auto parts, reflectors, bathroom fixtures, refinishing beds, mirrors, chandeliers; by new method. No capital or experience required. Simple plan of manufacturing at home starts you in big money-making business. Outfit furnished. Gold Metal Co., Ave. H, Decatur, Ill.

BIG Money and fast sales. Every owner buys gold initials for his auto. You charge \$1.50; make \$1.45. Ten orders daily easy. Write for particulars and free sample. American Monogram Company, Dept. 40, East Orange, N. J.

AGENTS—Opportunity to make money; buy equipment, get successful business plan, home or office; send for free introductory booklet. Elite Co., 211 Grand St., New York.

AGENTS:Stamping names on pocket-key protectors. Sample check with your name, address, 25c. Stamping outfit. Emblem checks, check-libs, name plates, Hair Mfg. Co., 2000 Broadway, New York, N. Y.

MAKING Cleaner. Cleans everything. Sample free. Bestever, 5007P Irving Park, Chicago.

A BUSINESS Of your own making sparkling glass name plates, numbers, checkerboards, medallions, signs. Booklets and sample mailed free. Palmer, 512, Wooster, Ohio.

PROFITABLE Home business. Legitimate. No canvassing. Playwood Publishers, P-600, New Albany, New York.

GENUINE Gold letters for store windows. Easily applied. Free samples. Libers offer to general agents. Metallic Letter Co., 428-429 North Clark, Chicago.

SELLS Like hot cakes. Big profits. New laundry soapflakes. Perfumes clothes lastingly when washing. Territory given. Sun-set Laboratories, Lynbrook, N. Y.

HIGH-GRADE SALESMEN WANTED

MEN Wanted by world-wide industry—Apply by letter only giving age, experience, references. Industry and reliability main qualifications. Man selected will become authorized Rawleigh dealer on our capital and taught how to establish a permanent business in 10 to 30 days and house necessities. Man with auto preferred to introduce products and travel steadily. Write immediately. Rawleigh Co., Dept. J-N-PPM, Write branch nearest you. Freeport, Ill., Memphis, Tenn., Richmond, Va., Chester, Pa., Albany, N. Y., Minneapolis, Minn., Denver, Colo., Oakland, Calif., Vancouver, B.C., or Windsor, Canada.

YEAR'S Income in 3 months! New federal, state and code laws create immense demand for simplified record system every businessman must have to protect himself against fines and penalties. Millions users must buy again now. Our men selling 5 to 20 days, our territory covers entire country. Liberty Tax Records \$3.50 cash profit every sale. Repeat commissions without callbacks. Live leads furnished. Big season now. Choice territories going fast. Commonwealth Publishing Company, 508 So. Dearborn, Chicago.

MAKE Big money steady. High grade coveralls, shopcoats, pants, shirts, summer suits. Advertising on summer suits. Free outfit. Saxon Mfg. Co., 901 West Jackson, N. S., Chicago.

DISTRIBUTORS: Represent original manufacturer. Bantex Modern Self-Sealing Bandage. Quality merchandise. Lowest prices. Profits enormous. Demonstration sells easily. Positive repeater. Beautiful displays. Territory available. Bantex, 443-D South Dearborn, Chicago.

AUTO ACCESSORY salesmen: Complete line fasteners, etc. You want to pay? Big commission daily. Exclusive territory. National, 1910-BA Wentworth, Chicago.

SALESMEN: Everybody buys business stationery. New items. Highest quality. Lowest prices. Free cuts. Quickest delivery. Big commission daily. Experience unnecessary. New way self selling outfit free. Williams, Dept. 57, 213 Gladys, Chicago.

SELL Hosiery for samples and opportunity. No cost job. Just show sensational guaranteed hosiery to friends. Dignified, pleasant, easy work. Everything supplied. Betterknit Hosiery, Outfit-3710, Columbus, Ohio.

BIG Money in the patches. Sell new auto tire patch to service stations, garages, etc. Tixer-Grip patches, guaranteed 10,000 miles. Our territory for selected distributor. Protect your territory. Write Economic Rubber Co., 716 Burkhardt, Dayton, Ohio.

STRANGE Chemical sponge, clean cars like magic. Banishes auto-washing drudgery. Sells on sight. 150% profit. Outfit free. Kristee Corp., Box 1140, Akron, Ohio.

TAILORING Sensation! Lates men's 3 piece suit outfit. Your price \$6.25. Commission \$3.00 on every order. Bonus. Suit furnished. Free outfit. Service Garment Co., 1615 N. Damen, Chicago.

5 SPOT Case on every \$1.00 sale. Contact with a bank. Bank to pay 50% daily profit of protection to cost. Everyone a prospect. Free outfit explains fully. Provident Aid Society, Dept. M-526, South Bend, Ind.

MAN—Handle regular store route. Place nationally advertised 5¢-10¢ counter card mix. Average deal, 16 tablets 10¢. 85 more fast soifers, 100% profit. No investment. Advertising free. United Products Co., Dept. 1810-A, Spencer, Ind.

WONDERFUL Opportunity. \$20.00 a day can be earned. No experience necessary. You can start at once. Showing the latest thing out. Self protection and home protection at cost. Ages 1 to 30. Not insurance but provides up to \$10,000.00 needed if sick or injured. Address National Aid Society, Dept. B, Springfield, Ill.

SHOE Manufacturer wants men. Big pay every day. Guaranteed quality. Low direct prices. No experience necessary. Sales outfit sent free. Write Consolidated Shoe System, Dept. C3, Chippewa Falls, Wis.

SALES Books and labels. Sell sales books in small quantities at attractive prices, also provide pocket label that sells at every stop. Good commissions. Technocrat, 79 Kingston, Boston.

GO Into wholesale business without investment. Call on stores with biggest line self-selling counter displays: Aspirin, razor blades, handkerchiefs, breathlets, household cement, 75 different items. Up to 125% profit for you. Experience unnecessary. Write for catalog and plans. Procopax, Dept. 38-BD, 1934 S. Troy, Chicago.

SALESMEN: Sell and install replacement shock absorbers. Large profits. Write Central Garage, Portland, Maine.

SALES Demonstrators. U-Can-Plate with pure silver, 1 oz. polish 20c, 8 oz. \$1. Justice, 904 Walnut, Philadelphia.

BRAND New grab-gag deal. Going big everywhere—big profits—swift sales—fast repeats. No restrictions. All dealers buy. Act! K&S, 4373 Ravenswood, Chicago.

FREE Literature describes money making plans. Ladmar Agency, Jefferson City, Mo.

SELL Small duplicating device. Permits one to make their own rubber stamps, minus the rubber. Liberal commissions. Ercady Duplomat, 132 West 46th, New York.

SALESMEN: Sell political candidates signs, bumper signs. Big commission. Whipple Co., Saginaw, Mich.

SELL Wanted. Sell shirts. No experience required. Free samples. Commission in advance. Free ties with shirts. Carroll Mills, 875 Flatbush Ave., Dept. E, Brooklyn, N. Y.

GREASE Gun salesmen—Exclusive industrial territories now open. Commission basis. Factory help. Demonstration kit furnished convinces prospects. \$25.00 deposit required. SSS Corporation, 138 Holden St., Minneapolis, Minn.

PENNY Each, popular sizes. Non-tarnishable window sign letters. Enormous profits. Free working equipment, samples. Record breaking offer. Atlas Sign Works, 7941 Halsted, Chicago.

MAKE More money selling shirts, ties, undershirts, dresses, hosiery, raincoat, garments, corsets, pants, uniforms. Outfit free. Nimrod Company, Department 65, 4922-28 Lincoln Avenue, Chicago.

SOMETHING New in fire extinguishers. Red Comet automatics. Proved in west five years. Exclusive territory. Low price opens pocketbooks. Write Red Comet, 401 Comet Building, Littleton, Colo.

SALESMEN: Acquainted with garages, filling stations, to handle local business. Write Coliga, 2623 N. Third St., Milwaukee, Wisconsin.

SELL 5 to 50¢ stunt gliders and real flying airplanes. Millions sold yearly. Sample free. Western Aircraft, 1269 South Norton, Los Angeles.

GIVE Money—Up to \$170,000 yearly. \$500,000 potential. Find opportunities now no investment plan. Season starting. K&S, 4326 Ravenswood, Chicago.

SALESMEN: Sell collection systems. 400% commission. Sayers Systems, 2801-123 Sheffield, Chicago.

STICK-ON Window sign letters. 500% profit. Free samples. Metallic Co., 438-A N. Clark, Chicago.

NEW Specialty—Sells every business and professional man. Four \$15 sales daily pay \$280 weekly. Foray cleared \$1920 in three months. Write, F. E. Armstrong, President, Dept. PM, Mobile, Ala.

SELL Stores or homes—Scissors sharpeners, gas lighters, razor blades, aspirin, breath gum, chewing laxative, adhesive tape, polish, handkerchiefs, polishing cloths, shoe laces, many others. Attractive displays. Catalog free. Superbe Co., S-303, Battimore, Md.

HELP WANTED

GROW Mushrooms. We show how. Use cellar, shed, etc. Plant now. Overnight crops. Splendid income. Data free. Interstate, NC-735 Cottage Grove, Chicago.

HIC Money growing mushrooms. Cellar, old place. Supplies furnished. Free book. Mushroom Growers Association, M-433 N. Clark, Chicago.

STOP Worrying about money—I'll start you with regular weekly route supplying famous "Zanol" products to steady consumers. Routes pay up to \$60 a week. Earnings start immediately. Write Albert Mills, Route Mgr., 4600 Monmouth, Cincinnati, O.

EARN \$5.00 daily raising mushrooms in cellar, shed, attic. We buy crops. Guaranteed materials furnished. Odorless method. Book free. United, 3848-AD Lincoln Avenue, Chicago.

AGENTS—Mosco corn and callous remover will bring you steady repeat business. Send today for pocket-size tiny outfit. The Moss Company, 44 Searie Rd., Rochester, N. Y.

\$100 PER Ton and up for certain common weeds, roots and barks. Particulars 10c. U. Merritt, 1732 Nicholson, St. Louis.

EDUCATIONAL AND INSTRUCTION

GET The position or job you want without payment of "service fees." Learn definitely how you can sell your personal services. Send immediately for free literature regarding our new modern effect system developed by experts. Stamp appreciated. Lohen, Box 521, Dent, P.M.19, Savannah, Ga.

WORK For "Uncle Sam," \$105.00-\$175.00 month. Fall examinations expected. List positions free. Franklin Institute, Dept. H3, Rochester, N. Y.

LATEST Developments in arithmetic easily learned. Frederick A. Smith, 2410 Belmont, Chicago.

BECOME An investigator. Free participants. Write International Secret Service Institute, PM-104, Hoboken, N. J.

GET U. S. government job—Start \$105-\$175 month. Men, women, age 18-33. Are you eligible for eligibility test? Get our free questionnaire—find out. No obligation whatever. Instruction Bureau, 101, St. Louis, Missouri.

LEARN Movie recording, projection, cameras. The greatest professions available today. Opportunities everywhere for trained men. Big money. Pleasant work. Motion Picture Engineering Institute, Dept. A, 6005 Hollywood Boulevard, Hollywood, Calif.

BOOKBINDING Taught by mail. For information write Hartley, 136 Malone Ave., Belleville, N. J.

HOME Study courses leading to degrees: Writing; arts and sciences; education; psychology; chemistry; law; theology; home economics; engineering; business; agriculture. Many others. McKinley-Roosevelt University, Chicago.

BECOME A landscape architect. Easy to learn by mail. Wonderful opportunity for money-making. Earn while you learn. Write for free opportunity booklet and details. American Landscape School, 805 Plymouth Blvd., Des Moines, Iowa.

MYSTIC New language. Ordinary conversation in one week. Instruction book 23c each. Zenith, Burlingame, Calif.

WRITERS—Will teach you how to compose letters which bring you \$1 per letter. Steady income, opportunities everywhere, all or part time. Human nature appeal, easy to learn. Free booklet. Letter Scribes, 639 Wall, Ridgewood, N. J.

LEARN Chiropracy. Complete course by correspondence. Evans Foot Inst., Montgomery, Ala.

U. S. GOVERNMENT Positions. \$1700-\$1800 and up yearly. Let us prepare (former government examiner) prepare you for position in the railway mail service, rural carrier, post office, customs and other branches. Write today for free booklet. Dept. 8, Patterson School, Rochester, N. Y.

SHORT STORIES

STORY Plot chart free. Stamp. Thos. L. Powis, Libertyville, Ill.

SHORT Stories revised, typewritten, marketed. Write for details. Hursh Service, Box P-1013, Harrisburg, Penna.

PRINTING, MULTIGRAPHING AND MIMEOGRAPHING

PRINTED Stationery and cards. Circular free. Circulars, 25¢ each. Manton, 931 Glenwood Road, Brookline, N. Y.

1000 LETTERHEADS, Envelopes, circulars, \$2.95. Low prices infants, folders, catalogues. Samples. Frazer Press, Box 45-D, North Tonawanda, Kan.

IMPRINTED Stationery! \$1 brings you postpaid 200 sheets of bond note paper, 100 envelopes, all bearing your name and address in a beautiful imprint. Address, Haldeman-Jones Co., Box 2, Girard, Kan.

STATIONERY. Circulars, checks, looseleaf, ruling, binding. Commercial Press, Batavia, Ohio.

1000 BUSINESS Cards \$1.00. Why pay more? Wright, 521 So. Spring St., Los Angeles.

1000 CARDS, Tickets, billheads \$1.40. Illustrations. Bradshaw, 3214 Huron, Chicago.

1000 BUSINESS Cards or 500 letterheads \$1.00. 6x8 circulars \$2.00. All sent postpaid. West Coast Printing, Five Points, Huntington Beach, Calif.

5000 ELEGANT Envelope slips—200 words \$3.90 prepaid. Labels. Circulars. Stationery. Low prices. Samples. Goodprint, Hanover, N. H.

2000 BUSINESS Cards neatly printed \$1.50. Atlas Distributing Co., Roberts St., Pittsburgh, Pa.

PRINTING. Mimeographing, low prices. Free estimates. Hunt Co., Box 202, Trenton, N. J.

ENGRAVURE Printing. Lowest possible prices. Samples free. Sunko, Mishawak, Ind.

BETTER Grade printing, reasonable priced. Free samples. Economic Press, Leonia, N. J.

1900 BUSINESS CARDS, card case, \$1.50. Miller, Printer, Ambler, Pa.

UNIQUE Gummed labels; rubber stamps; engravings. McPherson Popular Print, Midletown, Conn.

PRINTING OUTFITS AND SUPPLIES

BUILD Your own press, costs small, illustrated instructions 15c. Earle Nason, 19 High, Somerville, Mass.

PRINTING Presses and supplies. Lists 3c. Popular Bargains, Richland, Pa.

REBUILT Presses. Advise size wanted. Send sample. Exchange D-5, 480 East Main, Meriden, Conn.

PRINT Your own cards, stationery, circulars, advertising, etc. Save money. Easy rules furnished. Print for others, big profits. Junior press, \$5.90; job presses, \$11. power, \$119. Write for free catalog and full information. Kelsey Co., P-11, Meriden, Connecticut.

NEW Type 25¢ font. Catalogue dime. National Type Company, Jackson, Mich.

DUPLICATORS Rotary, new, guaranteed, \$14.50. Vari-Color Duplicator Company, Ottawa, Ill.

PRINTING Presses, type, supplies. Lawrence, 1426 North St., Francis, Wichita, Kans.

DUPLICATING Underwriters type. Send stamp. Box 15, Cambridge, Mass.

PRINT Your own circulars, envelopes, with home made press costing less than \$1.00. Illustrated instructions 10c. Carl Equist, Odessa, Minn.

PRINTING Outfits—Presses, type supplies, type novelties. Send stamp for catalog. Model Press, York, Penna.

TYPEWRITERS AND SUPPLIES

TYPEWRITER Ribbons 40c, three \$1.10. Guaranteed T-S-G Co., Box Ten, Wilkinsburg, Pa.

GUMMED LABELS

1,000 PRINTED: Name, business, address 50c. JRC Company, Box 93, Holyoke, Mass.

PRINTED: From your copy, 40c. 1,000 up. Samples free. Wetzel, Valparaiso, N. Y.

DUPLICATORS AND DEVICES

DUPLICATING Machines \$3.85 to \$95. Rotary, stencil, clay composition, gelatin film. Most complete line in America. Photo-Litho folder. Photo-Litho Typewriter Supply, Suite 577, Pittsburgh, Pa.

BUILD A duplicator. Costs less than dollar. Instructions dime. Paul Williscroft, Yakima, Wash.

LEATHER

LEATHERCRAFTSMEN—Write for free copy of WilderCraft and price list of leather tools, etc. Visit our exhibit in the Home Workshop, Section T, 2nd floor, General Exhibits Bldg., Century of Progress, 1934. Wilder & Company, 1038 Crosby St., Chicago, Ill.

RUBBER STAMPS

RUBBER Stamps, regulation business size and miniature. Fast service. Sent same day. Guaranteed. Northlake Envelope, Peoria, Ill.

RED-RUBBER, 2 Lines 25c; 3 lines 35c. Feiburg, 921 Farnam, La Crosse, Wis.

NAME, Address, 2 lines 25c; 3 lines 35c. Stamp Works, Auburn, Nebr.

TOBACCO

REAL Northern green leaf tobacco. Large trial package containing six kinds \$1.00. Farmers Exchange, Edgerton, Wis.

GUARANTEED Tobacco—Natural leaf chewing and smoking, 5 lbs. \$1.00; 10 lbs. \$1.50. Cigarette Blister, 5 lbs. \$1.00. Free gift. Howard's Plantation, Mayfield, Ky.

RAZORS AND BLADES

RAZOR Blades honed correctly. 1c each. Petersen Gutterstick, Rockford, Ill.

100 DOLPHIN Edge blades \$1.10 postpaid. G. Pennington, R1, Robbinsdale, Minn.

GILLETTE Type razors shave closer with Adjustable. 10c postpaid. Ajusto, 35 N 9th, Columbus, Ohio.

FIELD GLASSES, TELESCOPES AND MICROSCOPES

500X ACHROMATIC Rack and pinion microscope. Microscopic instruments of this power priced under \$15.00, an achromatic lens system which prevents color distortion. All refinements. Two pinions. Adjustable stand and mirror. Large stage. Not a toy but a scientific instrument whose low price is due to the fact that it is built from imported Slides and complete dissecting equipment. Send \$4.95 to Scientific Supply Co., Times Building, New York.

500X MICROSCOPE \$3.95. 30X telescope \$1.98. America's lowest prices. Optical catalog free. Brownscope Co., 216 Fifth Ave., New York.

SEND 10c for new catalog listing telescopes, binoculars, microscopes, kits and supplies. Special 30 day offer to those who send immediately. Winn Company, 124B West 23rd Street, New York.

CATALOG And new reduced price list on microscopes, telescopes, binoculars. Vure, 307 Throop Ave., Brooklyn, New York.

DIAMONDS, WATCHES AND JEWELRY

A BEAUTIFUL Wrist watch can now be yours. American made dust proof nonbreakable crystal, good time keeper, only \$5.00, but sold on easy payments. Also fountain pens, books and books that satisfy. Postcard brings details. Edw. Abbott, Rochester, Vt.

AUSTRALIAN OPALS

HUGE Collection large oval specimens, \$5.00, \$20.00 each. Lists free. Norman Seward, Melbourne, Australia.

GUNS, FISHING TACKLE AND SPORTING GOODS

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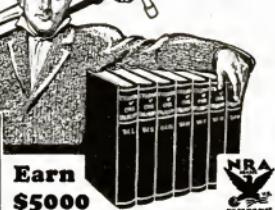
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Dear Mac: Please forward me your catalog. I want it to add to my traveling souvenirs. I am working in a modern garage although I have been out of school only four weeks, thanks to McSweeny Training. My best regards to all. M. Klushauk

Rector, Ark.

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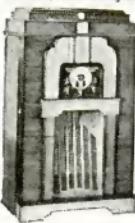
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All Power from the Sun

IT IS not what we know that is so important. It is what we do not know. Most of what we know can be found in libraries, in the minds of people and in processes as they exist today. But we have no conception of what a small percentage this is of what there is yet to know.

As an illustration, we perhaps do not recognize it, but everything that ever moved on the earth has been moved by energy which came directly from the sun. Our coal and oil deposits, our forests, our crops and everything that lives on the earth is simply an energy contribution from the sun.

We do not know, except in a very superficial way, how the energy which is given out by the sun is transmitted to the earth. This, when understood, will open up an entirely new conception of things that can be done. It is not difficult with this information in hand for even the most unimaginative person to predict the propulsion of airplanes by radiated energy with the power plants located on the ground.

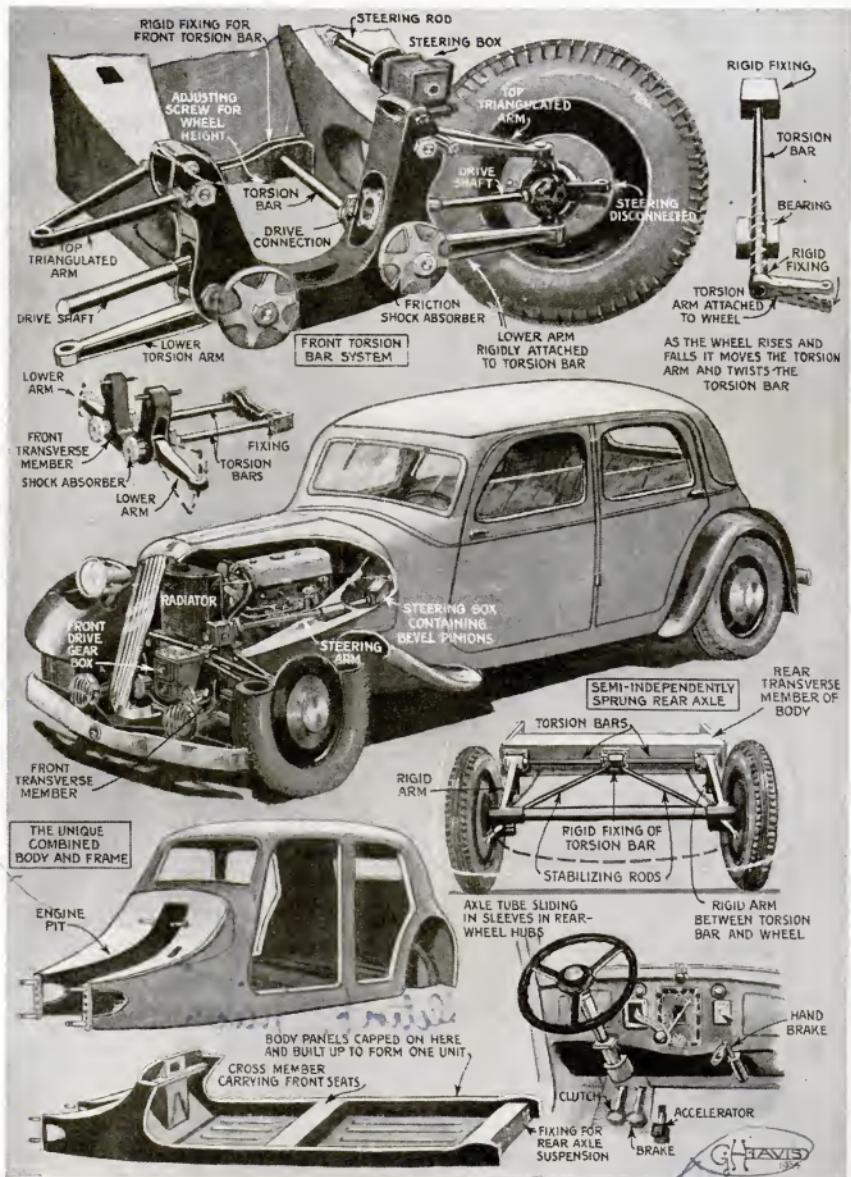
Each year we discover new things, which a short time ago we did not even know existed. I cannot help but feel that in a very short time we are going to break loose another great piece of basic information which will keep us industrially busy for a great many years to come.

By CHARLES F. KETTERING,
Vice-President in Charge of Research,
General Motors Corporation.

Detroit, Mich.

Douglas E. Webb
as personal notes

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Popular Mechanics Magazine

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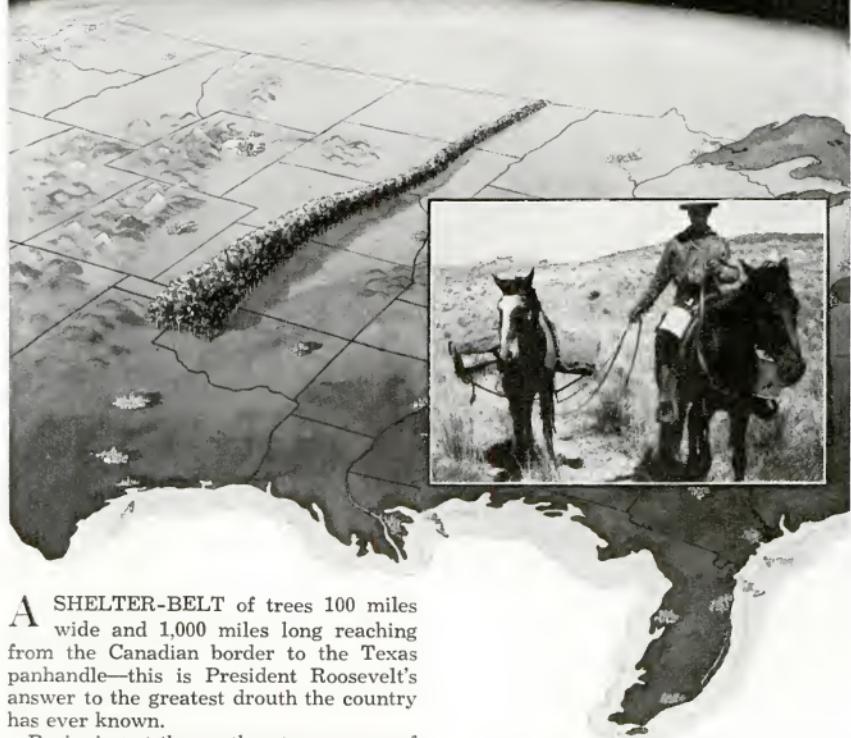
Vol. 62

OCTOBER, 1934

No. 4

D967

FIGHTING *the* DROUTH



A SHELTER-BELT of trees 100 miles wide and 1,000 miles long reaching from the Canadian border to the Texas panhandle—this is President Roosevelt's answer to the greatest drouth the country has ever known.

Beginning at the northeastern corner of North Dakota this protection forest belt will stretch through the Dakotas, Nebraska, Kansas and Oklahoma into Texas. The area immediately affected approximates 20,000,000 acres. Of these, about 1,820,000 acres will be planted to trees in the form of windbreaks running north and south, planted one mile apart, making approximately 100 parallel tree rows each 1,000 miles long. Each windbreak will be seven

Sketch Showing Shelter Belt as Planned and Pack Horse Carrying 4,000 Young Trees for Planting

rods wide, covering fourteen acres out of each square mile.

"If we can establish this zone," says Dr. Raphael Zon, forest service expert in charge of the technical phases of the great project, "we establish practically a humid belt in this semi-arid region. For trees

Cont. John L. County

483

*310 7-19th St N.W.
Washington, D.C.*



Photo Courtesy U. S. Forest Service

Forest Strips as Planned for Plains Section and a Fine Windbreak Which Has Been Very Effective in the Plains Country

create water. They draw deep from the soil and evaporate tremendous quantities of the precious fluid into the air. Seven-ninths of our rainfall is derived from land evaporation and only two-ninths from the ocean. The humidity of air among forest strips is from five to ten per cent higher than in open prairie country.

"Windbreaks check the velocity of winds sometimes thirty to thirty-five per cent. This has been shown in tests where tree strips 600 feet apart were used. Further, evaporation between the strips was reduced thirty per cent. This means that hundreds of thousands of tons of water

which would not have been delivered to the soil because of the winds are delivered and retained over a whole shelter-belt area.

"Windbreaks also act as snowbreaks. They catch the drifting snow of the sweeping winter winds and hold them for future moisture purposes. They also afford defense against the bitter, icy blasts that drive over the treeless countryside, and serve to hold in check the 'black blizzards,' those terrible summer dust storms born of drouth conditions."

The Great Plains region is a region of virtually periodic drouth. Since colonization of the region, the ground-water level has dropped from eighteen to twenty feet. But more damaging, perhaps, is the loss of soil from the area due to the high winds that sweep in from the more arid regions to the west. In these storms the loam and fine sand are first to go. What is left is called "blow sand." A semi-desert condition prevails. Or the wind whips off the topsoil down to hardpan, leaving nothing

to which vegetation can root. These barren, wind-swept lands are exposed to the ravages of rainfall and melting snow. Rain rushes off them in torrents, carrying with it what little soil of value remains from the winds. Deep ravines and gullies are eroded over the land; wrecked farms follow in the wake, agriculture languishes, farms disappear, drouths soon establish themselves between long separated rains, misery and suffering become the lot of the once prosperous community folk.

One of the first steps in the establishment of the new experiment will be the setting up of a chain of nurseries where the forest seedling will be grown. Trees native to the section through which the forest grove runs will be used. Those for the northern area will be, green ash, burr oak, native cottonwood, red cedar, blue spruce and native western pine. In the southern extension of the line utilization will be made of the osage orange and the native oaks. Conifers and shrubs will be used on the outer side of the belt to take off the inner trees the first heavy onslaughts of storms.

The economic value of the shelter-belt may be summed up as three-fold. First, protection of farm lands adjacent to it. Second, supply of the country through which it passes with wood, a scarce article on the plains. Third, stoppage of wasting of land through erosion, both by wind and flood, creation of work and checking of drouths. To fence the windbreaks will be a great labor in itself. Thirty to fifty million fence posts will be required to hem in the forest, 30,000 to 50,000 railroad cars will be required to transport the posts to their destination, and 200,000 miles of fence wire will be needed.

Only land planted to timber will be acquired by the government. Strips of land between the shelters will remain in the hands of the farmers. The total cost of the project is set at \$75,000,000. Ninety per cent of this will go to the farmers, largely for labor in establishing the belt, plowing, fencing, planting and caring for the trees. Large-scale planting will begin in 1936 and the entire area, it is expected, will have been planted in the next ten years. The rate of planting will be about 180,000 trees a year. The total planting will run three and one-half million trees.

D906 Lloyd Mfg Co
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D953
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DOGS HARNESSSED TO RAIL CAR HAUL BUILDING TIMBERS

How to transport building materials to a site far from good roads in northern Ontario, Canada, was solved by utilizing dog power to pull a small rail car. The dogs hauled the building materials in a fraction of the time it would have required to transport the loads over country trails.



Dog-Power Railroad Car Is Used to Haul Building Materials to Places Isolated from Highways

Cont. Leo H. Valiquette
243 Isingue St.
Atlanta, Canada

Drawing Showing How Tear Gas, Electric Alarm Signals, Sound-Sensitive Microphones, Safety Glass and Self-Closing Safes Aid the Human Guards in Protecting the \$2,500,000 Display of Diamonds at the World's Fair



Magee

D913

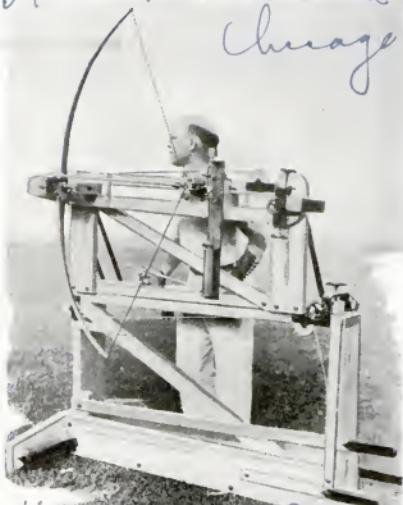
POPULAR MECHANICS

487

ROBOTS AID HUMAN WATCHMEN GUARD DIAMOND TREASURE

Thousands of visitors have viewed the \$2,500,000 display of diamonds at the World's Fair, but few have had any knowledge of the extraordinary precautions taken to guard these priceless stones. Visitors have seen an armed guard stationed on the floor and another guard peering through shatter-proof glass in an armored coop under the roof, but these human guards are only the first line of defense. Mechanical devices electrically controlled constitute the real protection for the collection. The display rests on two slabs set flush with the tops of two safes. The safes are enclosed in a glass case and inside the case of heavy shatter-proof glass is another glass case with sides and top more than an inch thick. By pressing a button, the man in the guard room can cause the gems to disappear and the safe doors to close in twelve seconds. In case of attack, another button in the guard room releases a mild form of tear gas intended to clear the room of visitors. A third button releases a gas so strong that no mask has been found to withstand it. The man in the guard house, by means of mirrors, commands a view of every occupant of the room at all times and is in a position to shoot down anyone tampering with the safe without danger to himself. Sound-sensitive apparatus connected to the safes also relays an alarm to the American District Telegraph company offices the instant the safes are tampered with and a squad of armed men can reach the diamond room from these offices in less than two minutes while a city police squad would be on hand in less than six minutes. The man in the guard house also can flash an alarm to both the A. D. T. and the city police instantly. The man in the guard house and the man on the floor change positions regularly, but the guard house door cannot be opened without setting off an alarm in the A. D. T. offices except when the guards, inside and out, press the proper signals. The guards are on duty day and night, but at night all entrances are locked and there is no way of getting to the diamonds in their safes set with time locks except through the guard house door which sounds an alarm in the A. D. T. offices if opened without the proper signals.

D920. 726 Cornelia Ave
Chicago



Keystone View Co.
Mechanical Archer Which Was Designed to Test Individual Arrows for Straight Flight

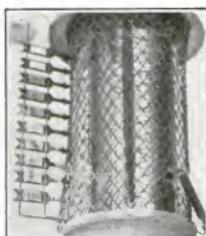
ARROW TESTER SHOOTS BETTER THAN THE BEST INDIAN

No Indian marksman could hope to compete with a mechanical archer, a machine designed to test arrows for straight flight. The apparatus is used to test arrows for archery enthusiasts and measures the degree of accuracy possible with each missile released from it.

D934. —

COST OF GASOLINE IS SHOWN BY PRICE GAUGE ON PUMP

Motorists can tell at a glance the price of the fuel which has been pumped into the tank if the gasoline pump is equipped with a price gauge as well as a gallon gauge. Metal arrows with price tags indicate the cost of the gasoline when the level in the glass tank falls to any of these arrows.



The price cards are inserted in slots and can be changed if the price changes.

speedy Segrest
Service Station

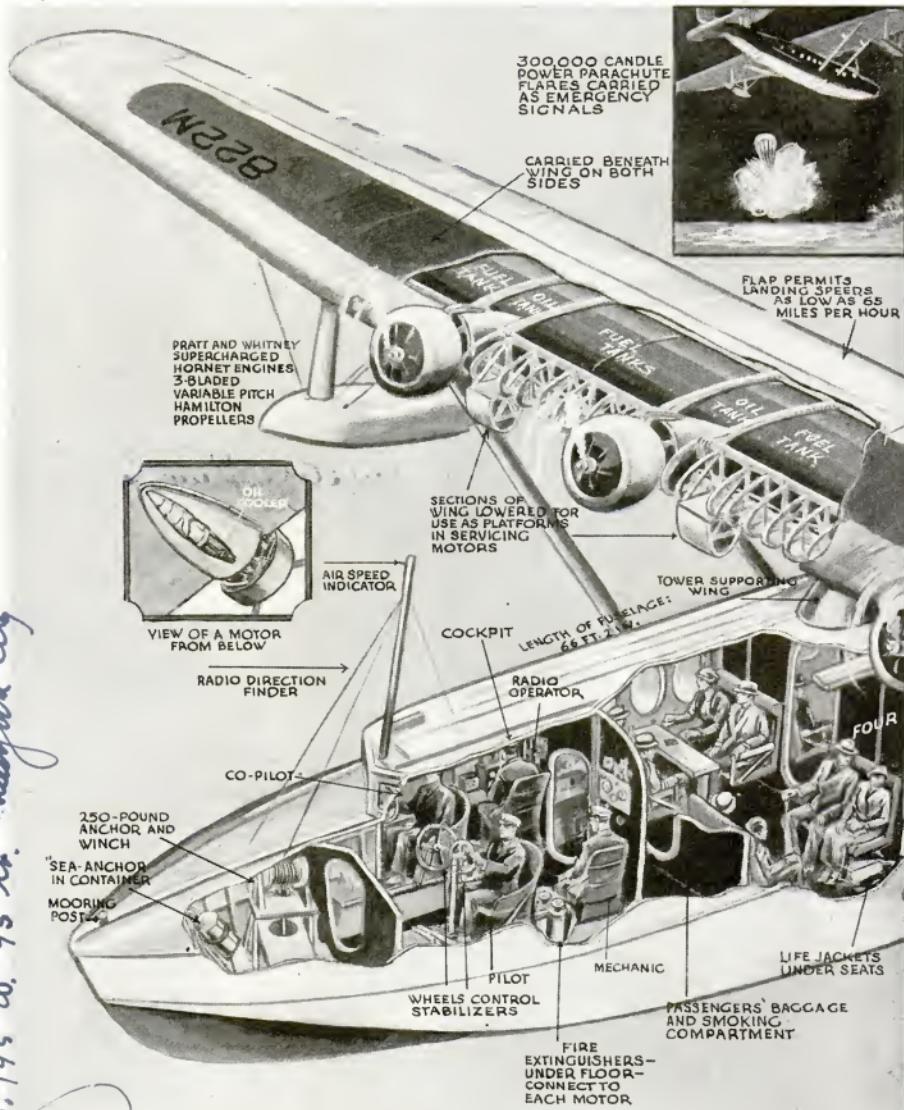
1500

D983
488

POPULAR MECHANICS

nodata

Giant Plane To Cut U. S.-Argentine Time



Flying Time between the United States and the Argentine Will Be Reduced by Two Days When the Giant Sikorsky S-42, Speedy Clipper Plane Goes into Service; Four Engines, Rated at 3,000 Horsepower, Drive the Loaded Ship at Speeds in Excess of 155 Miles per Hour

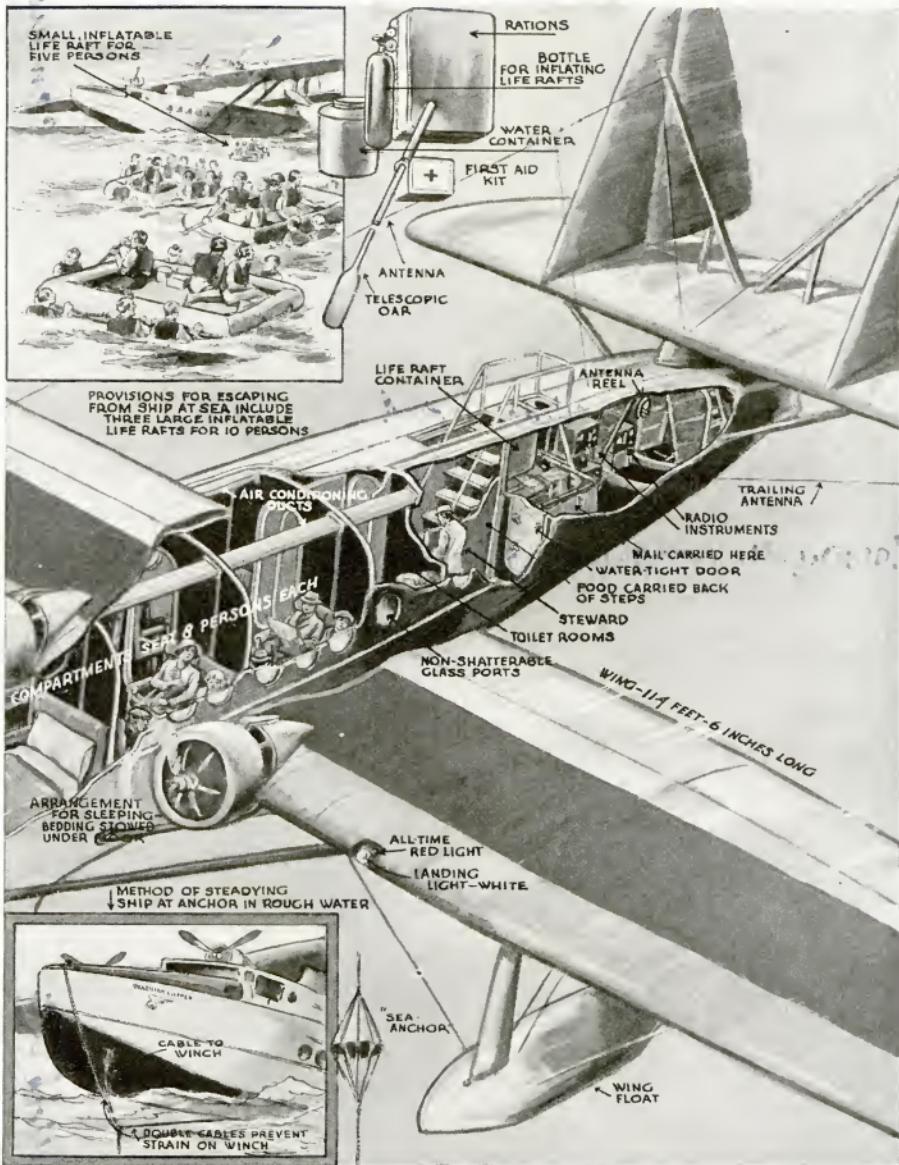
Modata

D983

489

POPULAR MECHANICS

Air Clipper Seats Thirty-Two Passengers



Greater Safety for Ocean Air Service Is Offered by the Giant Sikorsky S-42, Which Carries Thirty-Two Passengers and 2,000 Pounds of Cargo, Including Mail; Low Landing Speed, Powerful Emergency Flares, Inflatable Life Rafts, Radio and Special Anchors Are Some of the Safety Features

588 G.

Robert Research Institute
Arnold Hall

490

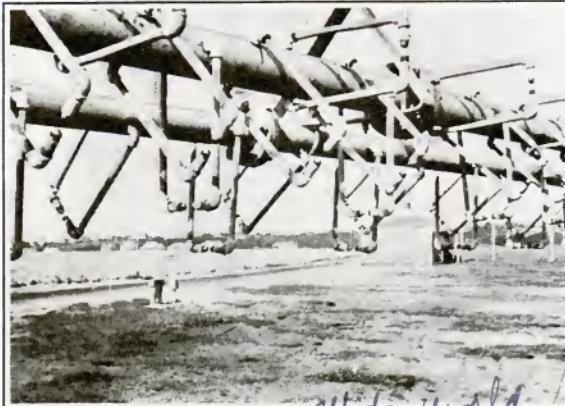
Dec 19

POPULAR MECHANICS

Mass

Cambidge, Mass

Fog Strained from Air by Chemical 'Curtain'



System of Nozzles Which Pour Liquid Chemical into Moving Air, Dissipating the Fog by Condensing the Water Vapor

Wide World

Fog, the deadliest menace to the aviator and the mariner, has been dissipated successfully with chemicals in experiments by

Henry E. Doughton, Jr.

Windows of Diving Ball Are Three Inches in Thickness

D941 When Dr. William Beebe, famous deep-sea explorer, resumed his submarine research this year off the coast of Bermuda, he descended to the ocean floor in a large metal ball, known as a bathysphere, the construction of which offered a knotty problem for engineers of the General Electric company. More than half a mile below the surface the pressure on this sealed globe is 980 pounds to the square inch. The sphere was made of steel with walls one and one-half inches thick but the big problem came when windows were discussed. Windows were essential to make the necessary observations but ordinary glass of sufficient thickness to withstand the great pressures would not be sufficiently transparent. Instead of glass, the windows were made of fused quartz eight inches in diameter and three inches thick. The quartz selected is more transparent than glass and has a compressive strength about six times as great. The three disks, after polishing and grinding, were sealed into cannonlike projections of the chamber. The middle window is for visual observation and for focusing a camera while

a path of visibility through the vapor just as though a big plow were moving through it and pushing it to each side.

the side windows transmit into the ocean depths the light of powerful electric lamps, the rays of which meet in front of the middle window. The bathysphere is large



Dr. Beebe's Bathysphere, Showing the Windows Made of Fused Quartz Three Inches Thick

enough to accommodate two observers, but there is no extra room when all the equipment is taken aboard. It rests on a wooden

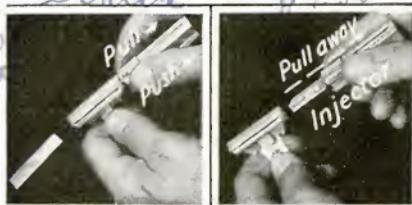
Sponsored by Dept. of Tropical Research
New York Zoological Society, 101 Park Ave

New York City

base so it stands firmly on the ocean bottom. Access is gained through a "man-hole" in the top which is bolted tight from the outside. Observers breathe with the aid of a twelve-hour supply of oxygen contained in small tanks, the vitiated air being absorbed by trays of desiccating chemicals. The sphere weighs about 5,500 pounds and is lowered by means of a hooking device and steel cables attached to the top. There is also a cable supplying power for the lights and a telephone by means of which the occupants can converse with attendants on the surface.

D939 BLADES INJECTED INTO RAZOR FROM METAL CLIP

Fresh blades are "pumped" into a safety razor by means of an injector in the form of a metal clip holding twenty thin blades. To fit a new blade, the injector key is inserted in a slot in the razor head and a slide is pulled back and pushed forward. This action ejects the used blade and inserts a fresh one from the clip. The razor itself is light and so shaped that it is balanced to shave at the lightest touch, making it possible to follow the contours of the face with the natural motion of the hand.

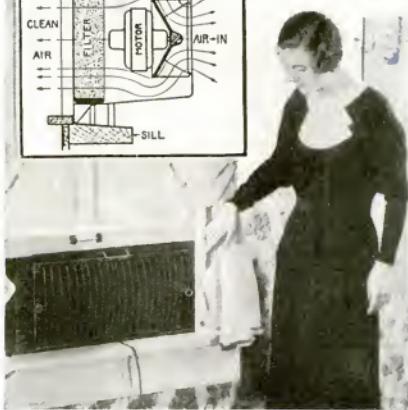
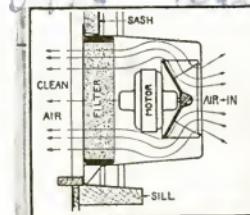


Injector Which "Pumps" Fresh Blade into Safety Razor from Metal Clip and Ejects Used One

hand, thus always presenting the beard squarely to the blade edge.

D946 AIR FILTER REMOVES POLLEN AND RELIEVES HAY FEVER

Relief for hay-fever sufferers is offered by an air filter which, it is claimed, removes about ninety-eight per cent of the pollen grains from the air. It has a noiseless, motor-driven centrifugal fan which forces outside air through a filter screen into the room, removing not only the pol-

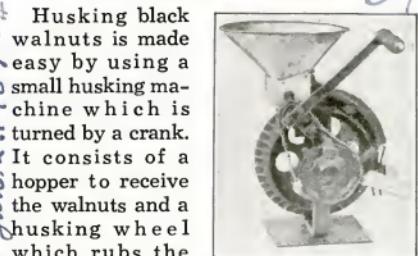


Air Filter Which Removes Pollen, Dust and Soot, and Diagram Showing How It Operates

len but soot, dust and dirt. The filter can be plugged into any light socket and occupies no space in the room. The motor and fan are on the outside and the filter rests on the window sill with the window lowered to hold it in place. A spacer is provided which is cut to fit windows of varying widths. Other windows and doors are kept closed, the filter building up a slight pressure sufficient to force out exhausted air through cracks. It supplies 11,000 cubic feet of air per hour.

D947 WALNUT HUSKER IS OPERATED BY TURNING A CRANK

D908.



Husking black walnuts is made easy by using a small husking machine which is turned by a crank. It consists of a hopper to receive the walnuts and a husking wheel which rubs the outer shell from the walnuts as they pass through the machine. The husker does the work much faster than it can be done by hand, and also prevents staining the hands.

J. B. Hershey, Pa.

WILEY POST

D 866



at Custer-Reynolds airfield
Chicago, Sept. 1934

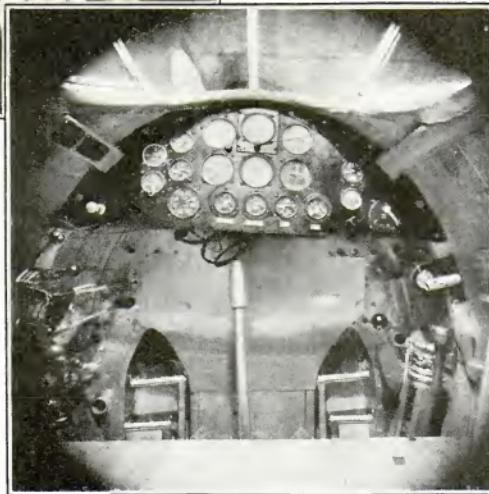
Acme Pictures
By WILEY POST
Famous Round-the-World Flyer

THE main objective of high-altitude flight is to increase the speed of travel. It is to develop practical methods of flying at as high as 50,000 feet, where the atmospheric pressure is only two pounds a square inch, that I have prepared a plane and special equipment.

To fly at extreme altitudes you first must have oxygen, and on top of that pressure to force it into your lungs and to keep down the tendency to bleed over the entire body. The thirteen pounds

differential pressure at high altitudes, compared with sea level, affects every cell in the unprotected body. Blood vessels in the eyes may rupture and cause permanent blindness. Heart action is affected, and other serious changes may result. Therefore, for all serious altitude flying, which we are coming to sooner or later, it is necessary to maintain pressure around the body by sealing off a space and pumping air into it. The same is true of certain parts of the plane itself.

In my opinion, to seal off the pilot's cockpit, sealing around all controls like the throttle, stabilizer adjustment and retractable landing gear



Wiley Post Demonstrating His High-Altitude Suit, and Instrument Panel of Stratosphere Plane

D866

seeks NEW RECORD

AT ALTITUDE OF 45,000 FT. PLANE TRAVELS A MAXIMUM SPEED OF 350 MILES PER HOUR

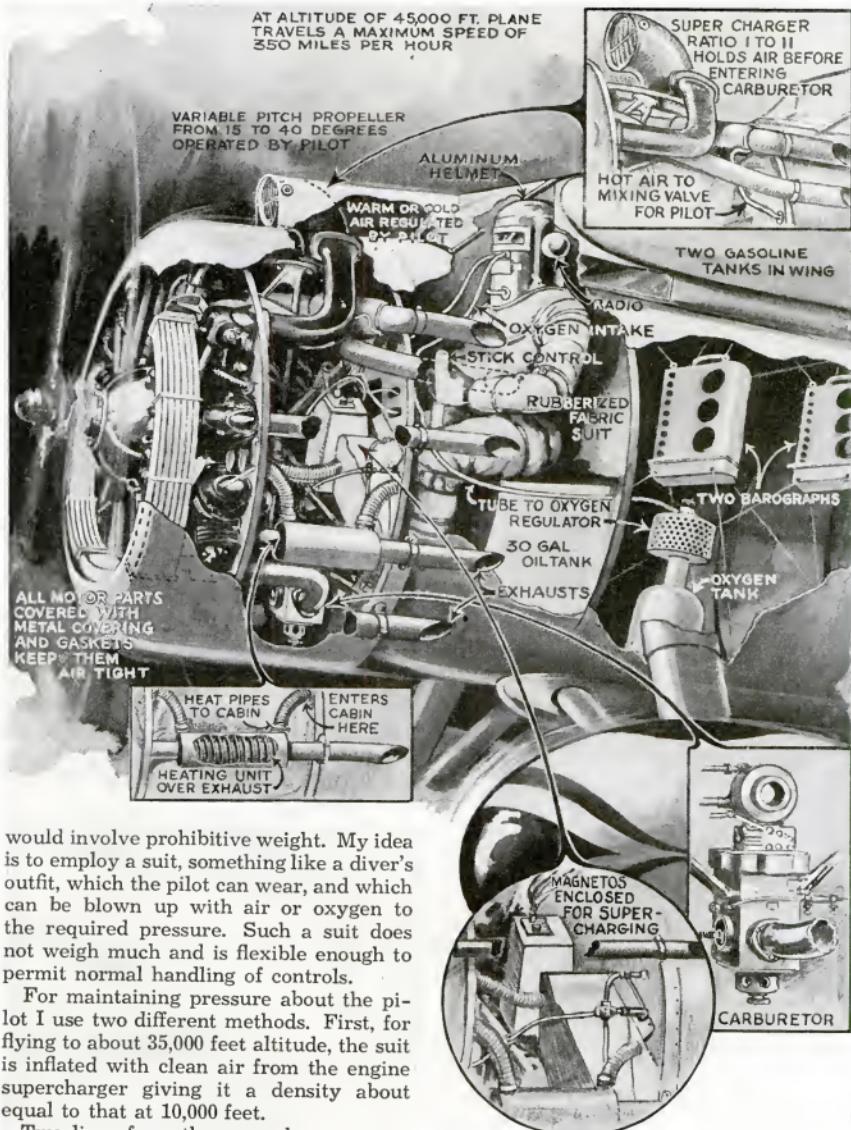


Diagram Showing Method of Supercharging; Note That All Movable Parts Are Airtight to Prevent Being Affected by Stratospheric Conditions

would involve prohibitive weight. My idea is to employ a suit, something like a diver's outfit, which the pilot can wear, and which can be blown up with air or oxygen to the required pressure. Such a suit does not weigh much and is flexible enough to permit normal handling of controls.

For maintaining pressure about the pilot I use two different methods. First, for flying to about 35,000 feet altitude, the suit is inflated with clean air from the engine supercharger giving it a density about equal to that at 10,000 feet.

Two lines from the supercharger carry air to the suit. One goes directly to a needle valve that can be controlled by hand.

DP663

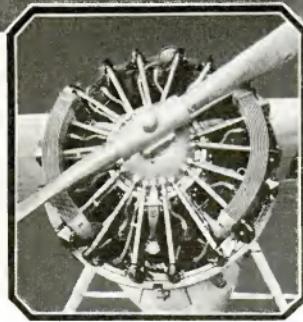
494

POPULAR MECHANICS



The other makes forty turns around the exhaust, and then connects to a needle valve. Lines from the two needle valves merge into one that connects with the suit at the top of the helmet. From the lower end of one leg of the suit a line runs to an adjustable relief valve on the instrument panel. This valve can be set to any pressure. By adjusting the two needle valves much as you regulate the handles of a bathtub faucet, I can regulate the temperature and amount of air inside the suit. The second method of inflating the suit, used for extreme altitude flying, dispenses with the entire supercharger system and employs an oxygen generator.

Normally a pilot can fly with ease at 20,000 feet altitude without auxiliary oxygen for short periods. When wearing the suit, I fly up to about 18,000 feet with a trap door in the helmet open. Before going higher, I close the door and start the oxygen generator, which will operate five hours on one filling. When using the su-



Top, Post's Plane, the "Winnie Mae," with Motor Covered for Stratosphere Flight; Center, Cooling System; Bottom, without Hood Covering

percharger for inflating the suit for flying up to 35,000 feet, an auxiliary tank of oxygen is available in the event the engine stops or the supercharger fails to work for some other reason.

The airplane itself is equipped throughout for stratosphere flying. It is of standard design, a Lockheed, and is powered with a Pratt and Whitney engine that develops 775 horsepower at sea level. With both stages of the supercharger in operation, this engine could turn out 1,400 or 1,500 horsepower at sea level.

The entire ignition system is supercharged. The magneto, cables, spark plugs and other parts are fitted with a special airtight harness resembling somewhat a system of radio shielding. The entire system is pumped up by the supercharger to a pressure approximating that at 15,000 feet. Without such supercharging, the ignition would not function properly much higher than 25,000 feet because electrical dis-

charges would occur in the rarefied air.

The plane uses a new gasoline having special properties preventing undue loss of fuel by boiling off at high altitudes. Ordinary gasoline boils when the temperature is 100 degrees Fahrenheit, and the pressure is seven pounds per square inch. At 50,000 feet altitude, the pressure is only two pounds. Therefore, such gasoline, which probably left the ground a half hour before at a temperature of seventy degrees, has not had time to cool sufficiently to prevent great loss by boiling.

I believe that, in the future, all flying will be done at altitudes of 50,000 feet or so when the distance is great enough to warrant climbing to that height. Transcontinental and trans-oceanic hauling of passengers and freight can be done in one-half the present normal time, simply by use of suitable supercharging of engine, pilot, and passenger cabin. No radical changes in plane or engine are necessary, but of course further refinement of plane and engine design and improved methods of streamlining will reduce the time even further.

D948 BARREL TYPE OF BOAT RUDDER MAKES QUICKER TURNS

One water taxi boat in service at San Diego is equipped with a barrel-type rudder fitted over the propeller blades. It is claimed that with this kind of steering gear the boat answers her helm more quickly, due to the greater surface on which water pressure is exerted when making a turn, the device acting much like a double rudder. This type of steering gear also protects the delicately adjusted propeller blades from damage through contact with floating objects.



Boat with Barrel Rudder Fitting over Propeller

No further data



*to be on sale in leading stores in
about Sept. 1st*
*Hand-Operated Emulsifier Which Reverses Churning
by Turning Milk and Butter into Cream*

MILK CONVERTED INTO CREAM BY EMULSIFYING PROCESS

Reversing the process used in manufacturing butter, a small hand-operated emulsifier converts milk and butter into cereal or whipping cream at only a fraction of the dairy price. The economy appeal of the emulsifier lies in the fact that butter fat sells for less as butter than it does as cream, and skim milk or dried milk can be used. The same device can be used in mixing ice cream, salad dressings, egg, malt and milk drinks. Inside a bowl is a small pump with the piston attached to the handle. Operating the pump handle forces the liquid through narrow grooves, breaking it into jets which strike the walls of the emulsifying chamber with sufficient force to disrupt fat globules, forming a cream or emulsion. The adjustments can be altered to make cream of salt butter, the salt first being washed out and then the cream is made in the usual way.

45 Richmond St. W. Toronto, Canada.

D957



clerk
Steel Eyebars Set in Concrete Anchorage Which Will Hold Strands of the Giant Cables Supporting the Oakland-San Francisco Bridge

EYEBARS SET IN ANCHORAGE WILL HOLD BRIDGE CABLES

Giant cables which will support the great double-deck suspension bridge spanning San Francisco bay between Oakland and San Francisco will be "tied down" to sturdy concrete anchorages. Big eyebars are set in these anchorages and other eyebars will be attached to them. To the latter the two cables will be fastened. Each cable will be nearly twenty-nine inches in diameter and will consist of 17,464 parallel wires spun in strands, the strands being attached to the cable anchorages.

WINDOW PANE WITH AIR SPACE PREVENTS FROSTING

Franklin 4643
Heat loss through windows is reduced and frosting in cold weather is prevented by a double-glazed window consisting of two panes of glass so fitted to each sash as

*Thermopane Co
Milwaukee Wis*
to provide a dehydrated air space between the panes. This type of window also eliminates condensation on the glass unless the inside humidity is very high. By reducing the flow of heat and cold, about fifty per cent of the usual heat loss through windows is prevented by the double glazing, tests have indicated. It is also expected that the double-glazing idea will be used in refrigerator display cases that are now so generally employed in grocery and meat markets.

D957 POWER BRAKE UNIT EASY TO INSTALL

Designed especially for light cars, a power brake increases the efficiency of the braking system and is easy to install since it can be bolted to the frame. It is of the diaphragm type, has a self-aligning pull rod without packing and does not freeze in winter. No change is made in the regular car brakes, power from the



Simple Power Brake Unit Which Can Be Bolted to the Frame of the Lighter Cars

July 1933
motor being applied and accurately controlled by the regular brake pedal.

*Safety Free w
wheeling Co 429 W*

D871

The MIRACLE of LIGHT

AT THE WORLD'S FAIR



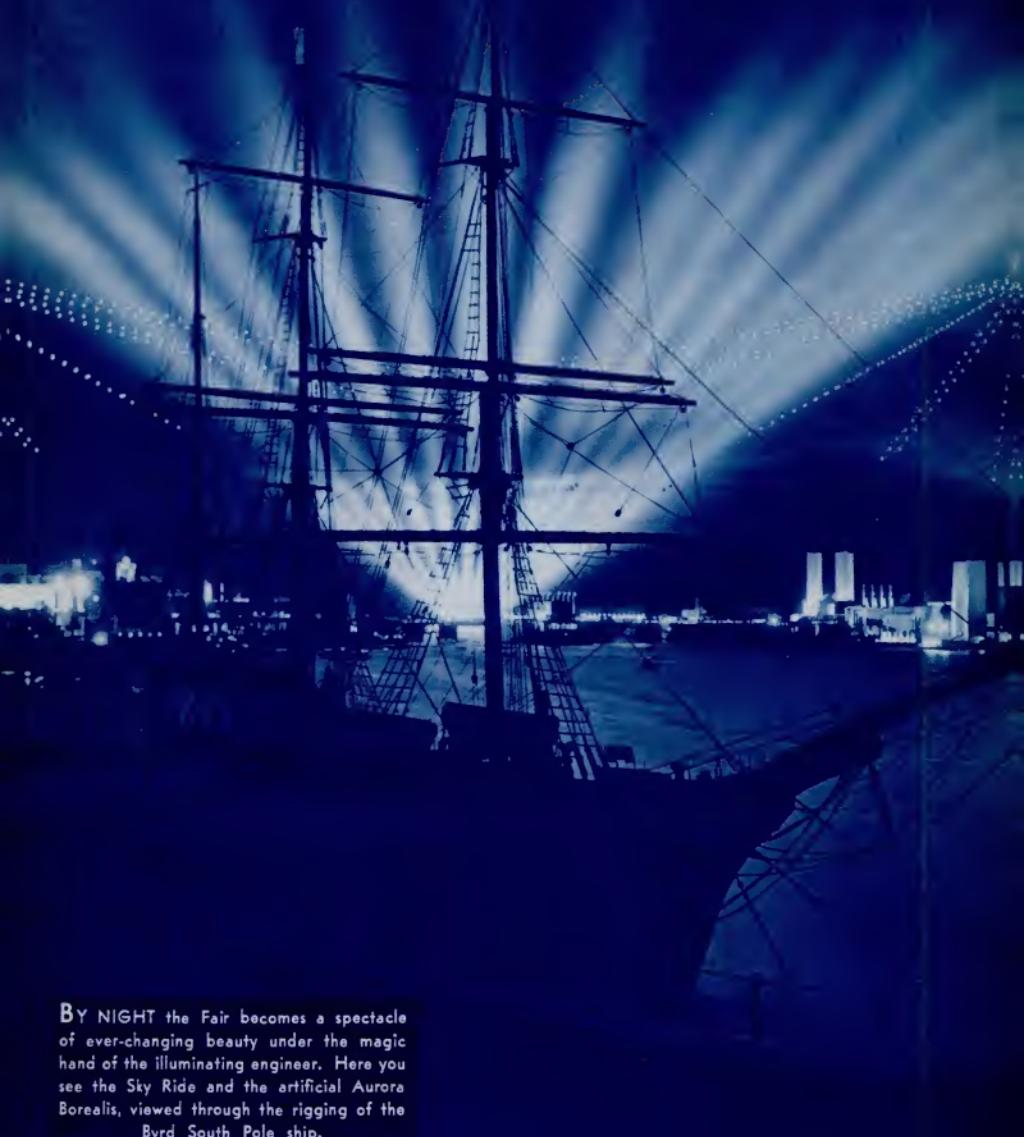
NIGHT illumination of giant fountain with searchlight Aurora Borealis behind it.

D871



FOREIGN villages lend a cosmopolitan air to the 1934 Fair. There are nearly a score of these foreign centers, each a faithful reproduction of the architecture and customs of the land it represents. Above, entertainers of the Swiss village in native costumes. Right, the courtyard of the Spanish village.





BY NIGHT the Fair becomes a spectacle of ever-changing beauty under the magic hand of the illuminating engineer. Here you see the Sky Ride and the artificial Aurora Borealis, viewed through the rigging of the Byrd South Pole ship.

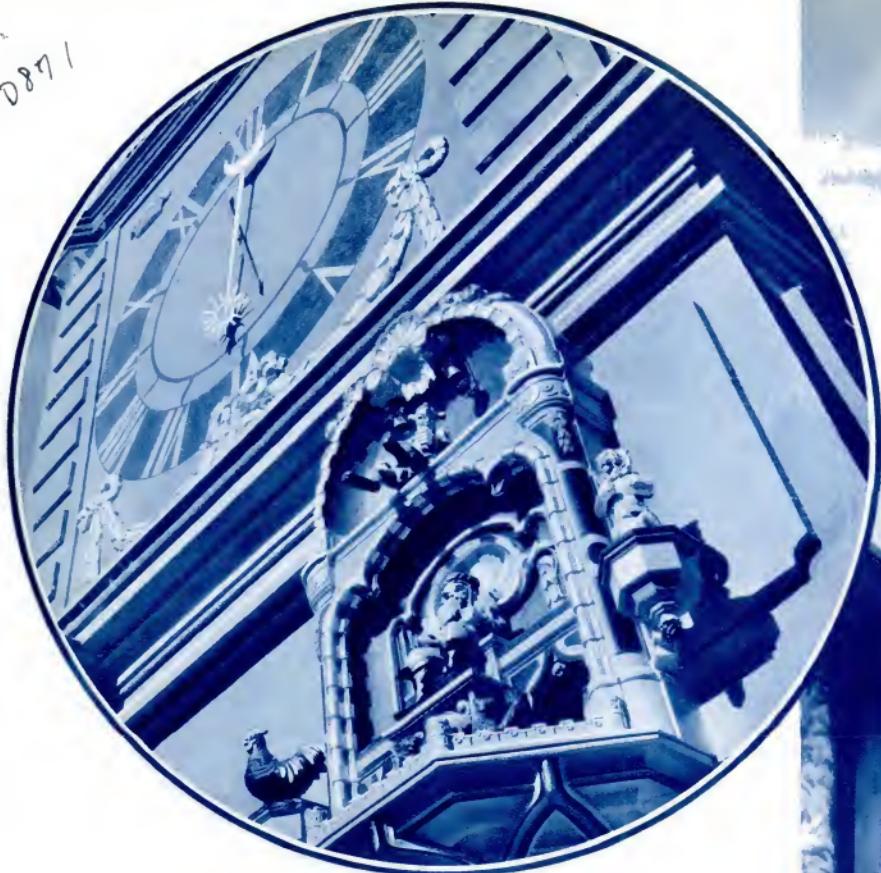


EVEN the historic ruins of the past, symbolical of the glories of an ancient civilization, are reproduced in the Old World villages. This is a scene in the Italian village, but the crumbling columns are so faithfully copied that it might well pass for a scene in Rome.



NIGHT scene at the Fair, showing some of the most spectacular lighting effects. Thirty-five miles of gaseous tubes and 250,000 incandescent bulbs contribute to this scene.

0871



THOSE who admire Old World artistry will find it in the foreign villages. These figures adorn one of the buildings of the Swiss village.

ONE visitor to Chicago's Century of Progress summed up his impressions in these words:—
“The buildings are crazy and the colors and lights are crazier,” he observed, “but the whole is a peep into a fairyland transcending in beauty any dream that could be conjured up by the wildest imagination.”

Perhaps he expressed the sentiment of a great many of the millions of visitors who have come to stare and to ridicule, then remained to admire. But whether you find the Fair gaudy or gorgeous, the fact remains that it represents the greatest spectacle of light and color ever achieved by man. Robbed of its brilliant colors and changing lights, it would be merely a collection of great ungainly structures, each no more attractive than a big barn. Paint and illumination transform these buildings and their surroundings into an ever-changing spectacle which impresses every beholder.

When it was decided that huge windowless structures



D89
711

WHAT would Switzerland be without its clocks and watches? Here is a courtyard of the Swiss village with the clock tower dominating the scene. Many of these villages contain reproductions of historic streets of some of the principal cities of the countries represented, others contain reproductions and models of world-famous buildings.



1081
were best suited to exposition purposes, it was also realized that such buildings did not lend themselves to the usual forms of architectural ornamentation. So color and lights as decorative features were conceived as a part of each building, and color experts and light engineers sat with architects and designers as each structure was planned, suggesting the colors to be used and the troughs and recesses necessary for the lights. Thus the colors and lights were incorporated in the buildings instead of being

added haphazardly afterward.

The color experts and the light engineers were forced to pioneer in this form of decoration and each color and light combination of the hundreds which make up the exposition represents hours and sometimes months of tedious laboratory experiments with paints, pigments and light filters. Of necessity, these men were forced to devise and invent as they proceeded and when they were finished they found that many of the effects they had created can be applied, in modified



D871



WHEN the sun goes down, the Fair becomes a fairyland of unbelievable beauty. At night the changing lights and softened colors transform the Century of Progress into an awe-inspiring spectacle which is never forgotten. Here is a night view of the Sky Ride and the artificial Aurora Borealis created by giant searchlights. Above, fireworks back of the lagoon fountain.

D841

LEFT, the St. Bernard dog isn't lost. It's right at home in the Alps on the shores of Lake Michigan. The man-made mountains are a part of the lure of the Swiss village and the St. Bernards are always on hand to rescue anyone who gets lost in them.



WHEN one goes to Italy, one is expected to view crumbling columns, and when one visits the Italian village at the Fair, he can also see crumbling columns if that is what he came to look at. This garden and the ruins in the background are a part of the "atmosphere" of the village depicting the life and customs of sunny Italy.



D 871



SNOW on the mountains, snow on the roofs, icicles—made of glass—on the eaves, skating on the millpond—that is the visitor's impression of the German Black Forest village.

form, to the average home.

One of the first things these men learned was that light and color have a psychological effect on men, and particularly on crowds. For instance, how would you coax several million tired visitors with sore feet to walk two or three extra miles without complaining?

The color and light men did it by substituting red paint and red lights for blue. Last year many visitors seemed to avoid Notherly Island, reached by bridges over a lagoon. Investigation disclosed such people walked



SINGING fountains illuminated from below. The lights are controlled by the music of a great pipe organ and the colors change with the organ notes. Above, left, a corner of the Spanish village. Above, right, statue to a robot in the court of the Hall of Science.

about the mainland until their feet ached. It looked like a long walk over to the island, so they went home instead.

Since it was impossible to move the island closer to the mainland, the next best thing was to make it seem nearer. Last year many island buildings were decorated in blue. This color, it was found, gave an illusion of exaggerated distance. So red was made a dominant color on the island this year. Red has a "drawing" effect and the red buildings appear nearer than they really are. Now people with

D87)





7891
TWO of the marvels of the Century of Progress as they appear at night—the tower and cables of the lofty Sky Ride and the illuminated fountain in the lagoon. This fountain is more than 800 feet long and has a flow of 68,000 gallons of water per minute.

sore feet hoof it over the bridges under the impression that the distance is less than is actually the case.

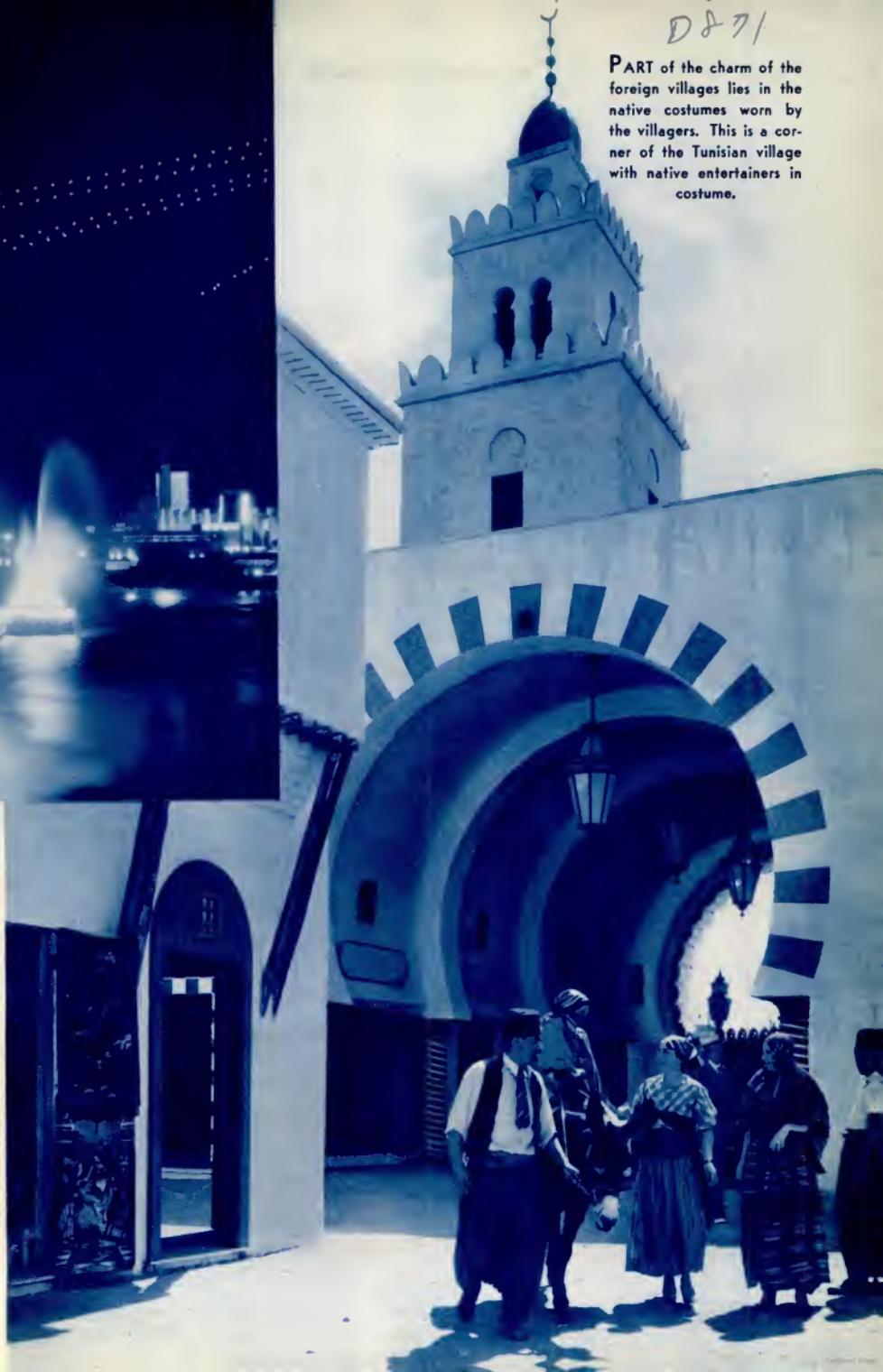
These experts also discovered that a bright light or a brilliant color attracts crowds of humans just as a light draws insects. If they want a crowd in any particular area, they simply make it brighter than surrounding areas. They also found that people believe that reds, oranges and yellows are warm and that blues and greens are cool. Gathering places such as the courtyards of the Hall of Science and Electrical building are painted in "cool" greens and blues for this reason.

The electrical illumination for the 1934 Fair totals 30,000,000,000 candlepower and for exterior illumination alone the power consumption is 5,000 kilowatts, enough electricity to supply the needs of a town of 10,000. The equipment necessary to produce this staggering amount of brilliancy includes thirty-five miles of neon, krypton, helium and mercury vapor tubes, 250,000 incandescent bulbs, forty arc searchlights totaling 2,800,000 candlepower, 1,200 thousand-watt floodlight projectors, 2,200 200-watt projectors, eighteen three-kilowatt incandescent searchlights of 21,000,000

(Continued to Page 126A)

D 871

PART of the charm of the foreign villages lies in the native costumes worn by the villagers. This is a corner of the Tunisian village with native entertainers in costume.



D891



ENTERING one of the foreign villages is like stepping back through the centuries. This courtyard in the Swiss village seems to radiate age and history.

Magic Insect Poisons Not Harmful to Man

Seemingly the bravest man on the government payroll is Dr. C. B. Smith, a federal scientist, who tastes poisons to determine if they are harmful to man. Actually his work is not as dangerous as it appears for the poisons he swallows are virtually magic potions. Chemical experts today are hunting insect poisons which will kill nothing but the pests for which they are intended and they have found several, including pyrethrum and nicotine. Nicotine is now being used extensively as the basis



of a poison compound called nicotine-bentonite which is a fruit spray harmless

Top, Cutting Out Leaf Disks to Be Fed to Bugs to Find Kind They Prefer; Left, Testing Insect Poison

to man. It is insoluble in water and is not easily washed from fruits by rain. It is unusually effective against the codling moth but it is costly to produce. However, efforts now are being made to produce a tobacco with a very high nicotine content in order to supply this poison at low cost. Cultivation of pyrethrum, the flower heads of which yield a deadly insect powder harmless to man, is being tried successfully in both California and Pennsylvania. It has also been found that an American weed, the devil's shoestring, is an insect poison which does not injure man, and powder from the Derris root will kill fish but is harmless to man while red squill powder will kill rats but will not hurt man.

Can John L. Conroy, 3107-19 H St., N.W.
C.M.

This ELECTRIFIED Home

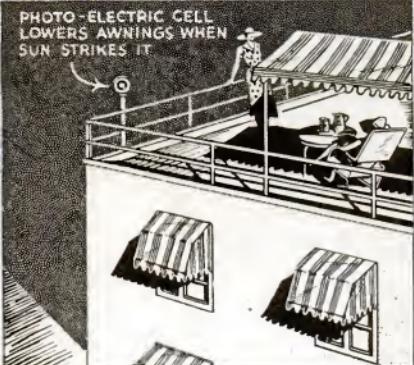
D 828.



The Globe at the Left
Contains Dust Fil-
tered from the Air of
the Electric Home in
One Week While the
Bowl Contains Water
Evaporated from the
Air of the House in
One Day



PHOTO-ELECTRIC CELL
Lowers Awning When
Sun Strikes It



Diagrams Show How Kitchen Is Kept Free of Smoke
and Odors and Electric-Eye Awning Control

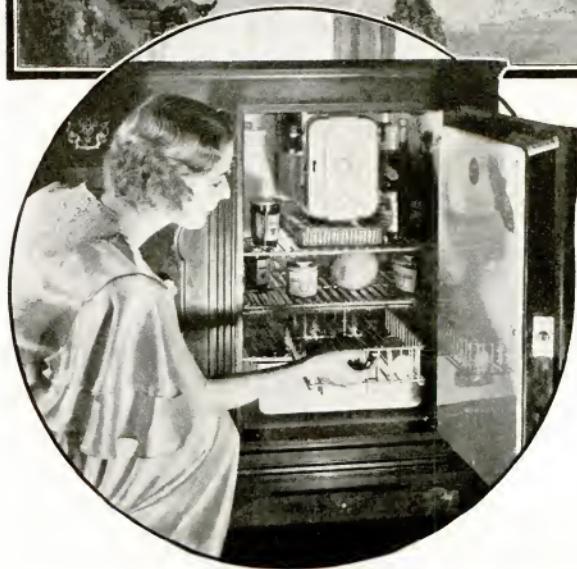
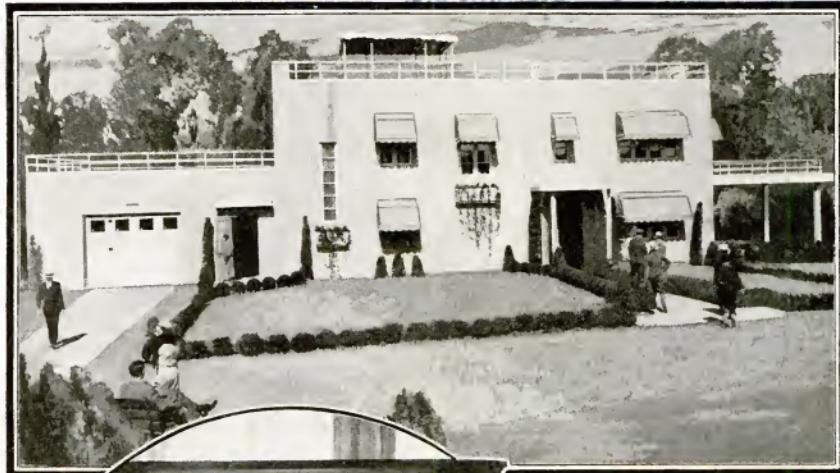
HOMES so nearly automatic that they are almost ghostly in operation soon will be available to the public at moderate costs. In them, doors will open and close at the touch of a button, windows will shut themselves when the first raindrops splatter the sill, awnings will run up or down as the sun changes its position, beds will be raised or lowered by handy controls, temperatures will change from hot to cold or back again and all air will be cleansed and humidified or dehumidified by operating small levers and buttons.

A sample of the all-electric home, constructed by the Frigidaire corporation for exhibition purposes, is replete with things that run themselves or that start operating at the pressure of a button. Much of the equipment is ready for the market and the remainder of the electrical and automatic marvels will be offered when the public demands them.

Temperatures as you like them are manufactured for this house by air-condition-

Runs ITSELF

D 828
at World's Fair



The Electrified House, and Electric Refrigerator in Ultra-Modern Cabinet for Master Bedroom

the sun comes out, and drawn up when the sun sets or hides behind a cloud. This is accomplished by means of a photo-electric cell and relays that operate electric motors. When bright sunlight reaches the "electric eye" located on the roof, it causes the controls to release the awnings, which lower of their own weight. When the light grows dim, the electric eye sets an electric motor to work, pulling the awnings to closed

ing equipment that can be installed for about ten per cent of the construction price of any home. The air-conditioning equipment filters and washes the air, removes or supplies moisture as required, and heats or cools it before circulating it to all parts of the house.

The house is also equipped with awnings that are lowered automatically when

position. Windows are equipped so that they close immediately when raindrops fall on a sensitive recorder, located on the window sill, an almost unnoticeable watchdog that acts when the residents are away or asleep. This recorder contains a small piece of wood that curls downward when a single drop of water falls on it, making contact with a switch that starts the small



Keyboard Controls for Windows, Doors, Bed and Air-Conditioning Plant

electric motor to closing the windows. One room of the house is designed especially for the man who demands comfort without expenditure of effort. Buttons on a small remote-control board actuate electric motors that raise and lower the bed, open the windows at night and close them in the morning, open or close the sliding door and regulate temperatures—all without moving from the bed.

If the screen is raised, none of the windows controlled by the electric motor at that point can be opened or closed, a safety switch holding them in position until the screen is lowered. This prevents the windows from slamming on the fingers and from being operated by remote control.

In the master bedroom is an electric refrigerator encased in a beautiful cabinet that matches the other furniture, offering the possibility of cooling drinks and midnight snacks without visiting the kitchen. Glass that is transparent or opaque, depending on which side you stand and on which side a light is placed, is a feature of one door at the top of the stairs. With the

light in proper position, the glass serves as a mirror while persons on the other side cannot see through it.

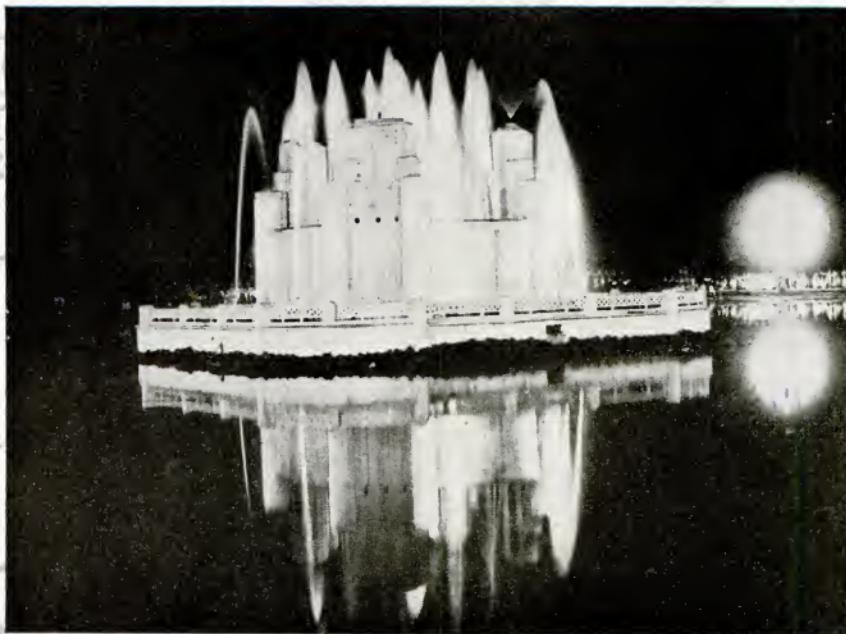
The kitchen contains an electric refrigerator, electric stove and other electrical equipment, also a powerful exhaust that pulls fumes and smoke from the vicinity of the stove to the outside.



Diagram Showing How Windows Are Closed Automatically by a Small Motor When It Rains; Note Remote-Control Board

D914

Fountain Like a Snow Castle Honors Sousa



Beautiful Fountain in a Philadelphia Park Which Appears Like a Huge Snow Castle When Illuminated at Night; It Was Erected in Memory of John Philip Sousa, the Bandmaster

In memory of the celebrated bandmaster, John Philip Sousa, a beautiful fountain has been erected at Willow Grove Park, Philadelphia, where he once played. The structural work of the fountain itself and the columns of water emanating from it appear like a great castle of snow when the whole is illuminated at night.

D914 INVISIBLE LIGHT FROM STARS SHOWN BY PHOTOGRAPHS

Brilliant rays of light from some of the stars are invisible to the human eye, either because they are ultra-violet with wave lengths too short to be seen or infra-red with wave lengths too long to be seen. The most intense radiations of very hot blue stars are in the ultra-violet, Dr. Paul W. Merrill of Mt. Wilson observatory says, and the most intense light of the cool, red stars is in the infra-red. Improvements in photographic emulsions enable scientists

to photograph many of the invisible stars, thus adding to their knowledge of how the universe was put together.

D916 SANDPAPER BLOCK HOLDS ABRASIVE IN PLACE

Sandpaper is held securely in position for use on a wooden block containing a metal clip for fastening the paper. The paper is cut into three strips and one strip is inserted in a slot in the block and wrapped around it lengthwise. The metal fastener is then pressed down to hold it in place. Each side of the block can thus be used and the narrow end is handy for sanding in close quarters.



Carnegie Institution
Pasadena, Calif.

Inventor and
manufacturer

D 903
518

Designed by J. W.
Shillcox
POPULAR MECHANICS
motor boat racer.



Wide World

Baby Car, Equipped with One-Horsepower Motor and Carrying One Passenger, Now on Market in England

ONE-HORSEPOWER MIDGET CAR CARRIES ONE PASSENGER

So small that it can be run under a horse of average size, a midget motor car has made its appearance on the streets of London. The baby car, equipped with a one-horsepower motor and carrying one passenger, is being placed on the market in England.

ATOMIZER FOR ELECTRIC FAN KEEPS INSECTS AWAY

D 904
Flies, mosquitoes and other insect pests can be driven away with an ordinary electric fan if it is equipped with a spray attachment which

disseminates finely atomized particles of any liquid insecticide as the fan operates. It consists of a container for the insecticide which is attached to the top of the fan guard. In front of the fan is a flag which whips when the fan is running and causes a valve plunger in the bottom of the container to operate, thus releasing small quantities of



the liquid which trickles through a trough to a felt pad where it is blown into the air. An occasional refilling of the container is the only attention required and the same device can be used for the application to a room of perfume or other sprays.

D 901

"GLARE METER" TESTS AUTO HEADLAMPS

Traffic officers in St. Louis are using a "glare meter" invented by a policeman to test automobile lamps for violation of regulations governing headlights. The instrument is so sensitive that a wisp of cigarette smoke passing between lamps and a photo-electric cell is registered immediately on the dials at the back of the tester. These dials are illuminated with

bulbs burning current from dry cells contained in the board. The compact equipment is used to replace the bulky boards with black painted lines which formerly were carried to the boulevards when headlights were to be tested. Levers control the movement of the photo-cell vertically

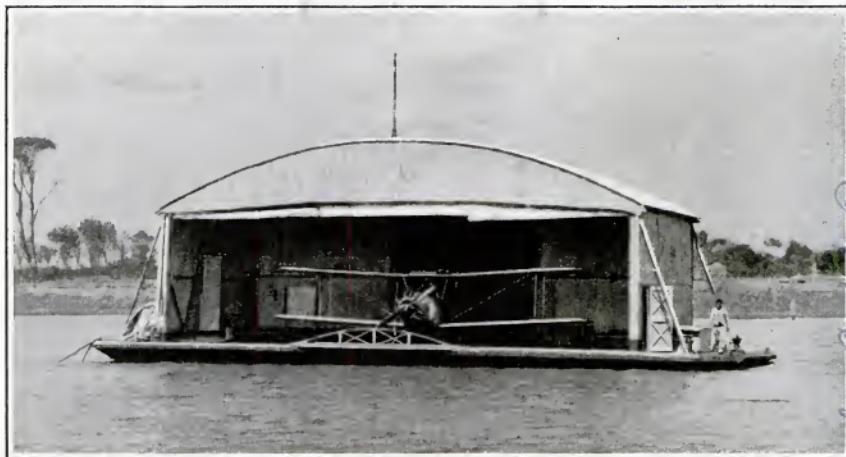


Portable "Glare Meter" Equipped with an Electric Eye for Testing Automobile Headlights

and horizontally and from readings on this movement, calculations of the angles of the light from headlamps are made, enabling the proper corrections.

16th Commercial
St. Louis, Mo.

Floating Seaplane Hangar Rests on Pontoons



Floating Seaplane Hangar Built on Pontoons; the Hangar Can Be Lowered to Admit a Plane by Flooding Some of the Pontoon Compartments with Water

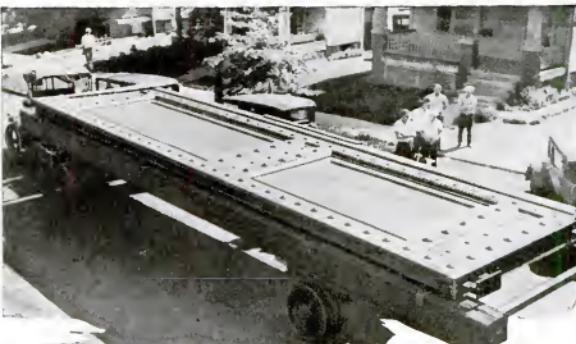
Designed on the principle of a floating dock, a floating steel hangar for seaplanes is anchored in the Yangtze river and can be towed anywhere as occasion demands. The structure is built on a hull consisting of two longitudinal pontoons held together by transverse girders and deck plating. Each pontoon is divided into five watertight compartments, the center one being the flooding compartment. In the center of the hull is a dock or trough in which

the floats of the seaplane normally rest. At the front of the trough is a hinged door which is watertight when closed. When the seaplane is not in use the hull rests at its normal water line, the trough door is closed and the bottom of the trough is above water. When the aircraft is to be launched, water is pumped into the flooding compartments and the hull is sunk to its low-water line, the door is opened and the trough is flooded with water.

D832. Ten-Ton Door Made of Bronze Is Thirty-Five Feet High

Mighty doors of bronze guard the entrance to the new archives building in Washington, D. C. Each of the doors is thirty-five feet high, nine feet wide and one foot thick, and each weighs more than ten tons. They were made in Cleveland and hauled by truck to the capital.

Our Bureau of Information will answer questions regarding articles in this magazine, if accompanied by return postage.

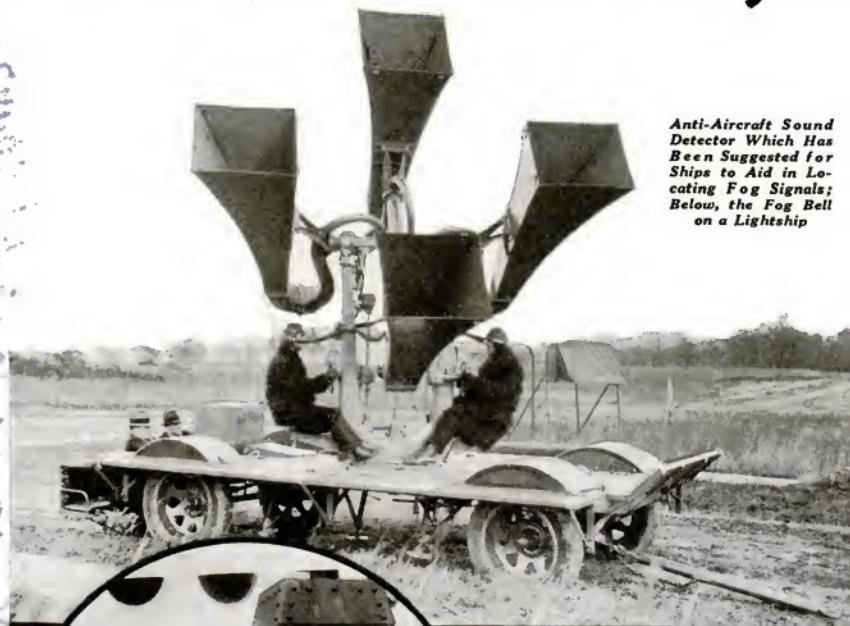


Bronze Door, Thirty-Five Feet Long and Weighing More Than Ten Tons, on Way to Washington to Guard Entrance to Archives Building

*made by John Haasch
Bronze & Foundry Co.*

DECEMBER 20, 1937

FOG still Challenges



Anti-Aircraft Sound Detector Which Has Been Suggested for Ships to Aid in Locating Fog Signals; Below, the Fog Bell on a Lightship



WITH 20,000 collisions due the fog during the past ten years, causing a total loss of more than 23,000 lives, inventors need not worry about no more worlds to conquer, for fog still remains the chief navigation hazard despite the many safeguards now available to all shipping.

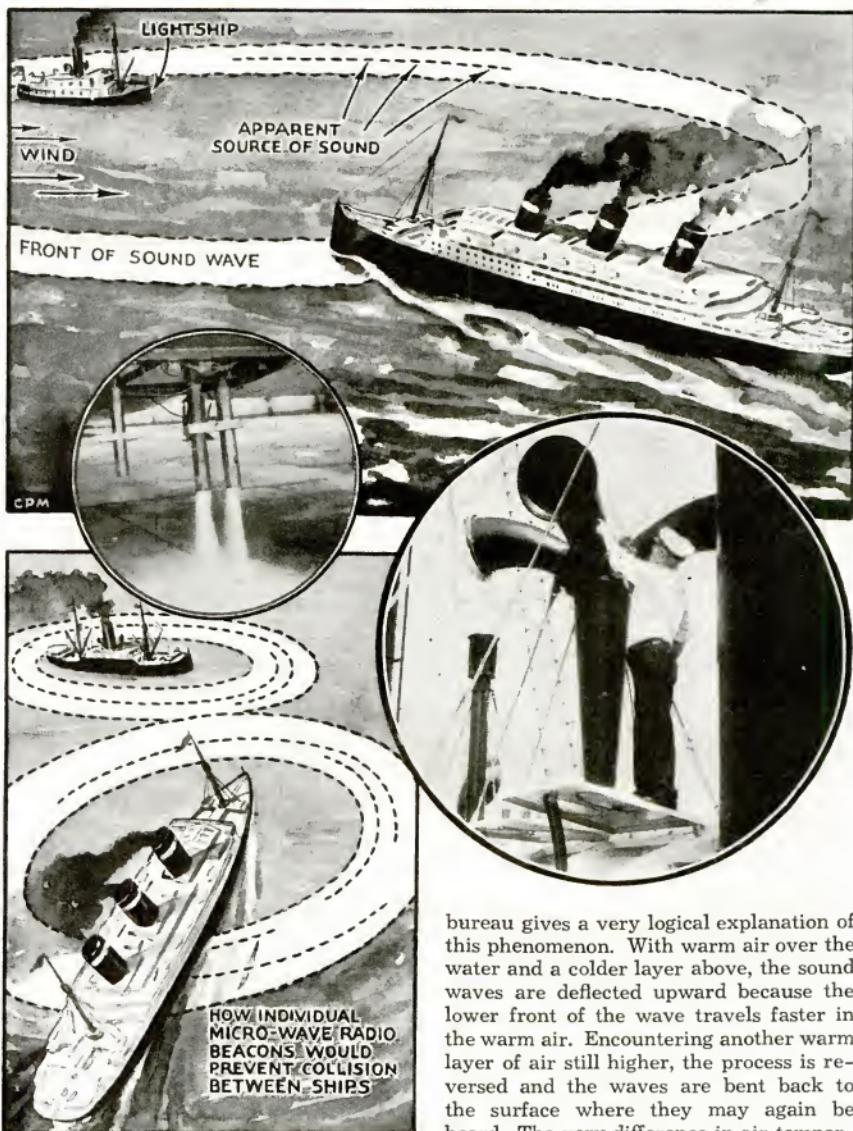
With the perfection of the radio beacon and direction finder it seemed that it would at last be possible for a ship to approach a harbor with safety, yet twice during the past spring the Nantucket lightship served as a magnet rather than a warning.

Many mariners prefer to trust their senses rather than new-fangled instruments, but the senses are notoriously unreliable. Especially is hearing apt to deceive one. A few years ago a ship run aground in a fog only 200 yards from a fog siren, no one aboard hearing the wail that kept persons awake on shore twelve miles away. There was nothing wrong with the ears of those on the ship, for it has been proved that sound may be heard quite distinctly miles away and still be inaudible close at hand.

Dr. W. J. Humphreys of the weather

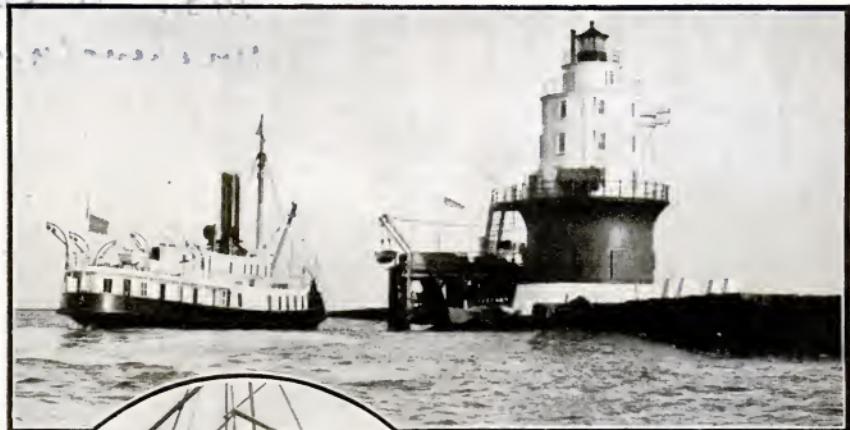
D822 Cont. Robert W. Gordon
c/o The Infantry Journal.
11/5/47 Lt. U.S.A.
Washington, D.C.

INVENTORS



Top, How Wind Distorts Sound; Insets, Using Sand to Disperse Fog, and Foghorn on Lightship

bureau gives a very logical explanation of this phenomenon. With warm air over the water and a colder layer above, the sound waves are deflected upward because the lower front of the wave travels faster in the warm air. Encountering another warm layer of air still higher, the process is reversed and the waves are bent back to the surface where they may again be heard. The very difference in air temperatures that causes the distortion of sound also causes fog. Near-by land or even the



Lighthouse in Delaware Bay, Masthead Light of Lightship and Diagram Showing How Differences in Air Temperature Distort Sound

front of a fog bank may deceive a hearer by causing echoes. Ferry pilots operating between San Francisco and Oakland usually hear the San Francisco siren until half way to Goat island. The signal is then lost, to be heard again when coming close to the island, which then seems to be the source of the sound.

Wind can also distort sound waves so that their source is deceiving. In still air sound waves take the form of a rapidly enlarging circle, but wind tends to bend this circle into an ellipse. Since the source of sound appears to originate at right angles to the front of the waves, the distortion of this front will cause the hearer to misjudge the direction of the source. Even sound detectors similar to those used by anti-aircraft gun crews have a ten-degree probable error, but the unaided ear may be off as much as ninety degrees.

Radio beacons and direction finders are so accurate that with two or more cross bearings a captain may obtain his position in a few seconds when the sun, stars, lighthouses and other markers are blotted out by fog. Yet the full usefulness of radio in fog is still to be developed. Last year the lighthouse service tested a device that tends to prevent collisions between ships—something the present radio beacons cannot do. The idea is to equip each ship with its own individual radio beacon, which will broadcast a different signal in each quadrant of a circle. For instance, for forty-five degrees on

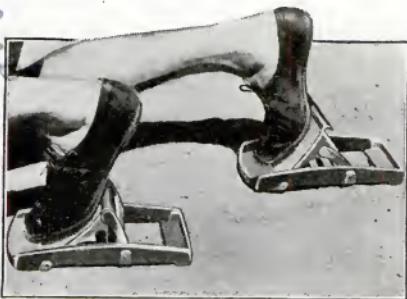
each side of the bow it might broadcast a dash-dot, while in a similar angle aft the signal would be dot-dash. Two dots would be sent off the port beam and two dashes off the starboard beam. An approaching ship, hearing the signal, would not only have the bearing on the sending ship, but would be able to determine in what direction she was headed.

Practically all useful inventions for combating fog have been of an auditory nature—radio and sound signals. Try driving your car down the street some time with your eyes shut, depending upon your ears alone, and you will get an idea of the helplessness of a captain who must navigate his ship in fog; for a ship, to maintain steerage, travels at a rate of speed that makes stopping in less than four times its own length impossible. To do away with the menace of fog, an adequate visual signal must be developed. Dr. Humphreys says it is impossible to develop any light that will pierce fog for more than 300 feet. The glow of light reflected from fog droplets can be detected on a dark night at a greater distance, but the source of the light cannot be judged with accuracy.

(Continued to page 116A)

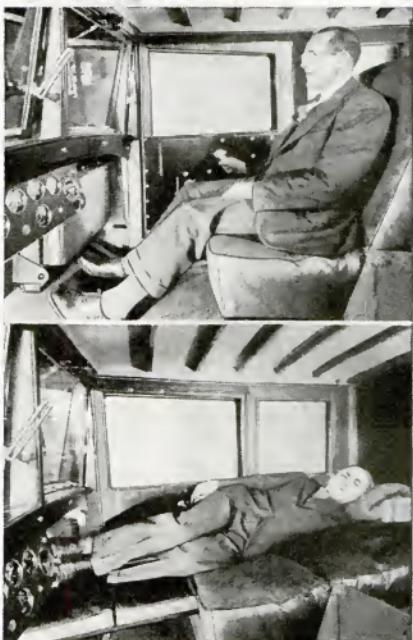
SPRINT BLOCKS FOR RUNNERS PERMIT FASTER START

Aluminum foot brackets or sprint blocks enable the track runner to make a faster and more accurate start. The blocks have spikes for gripping the ground, giving the runner a positive thrust with his feet. Treads of the blocks are adjustable to forty-five and sixty degrees because the rear foot usually takes a sharper angle.



Sprint Blocks with Adjustable Treads Which Enable the Runner to Make a Faster Start

The Autocar Co. 1887 Ardmore Pa. Sleeping Berth in Truck Cab Formed by Lowering Seat



Adjustable Seat in Truck Cab Which Is Quickly Converted into a Comfortable Bed

Comfortable sleeping quarters for a passenger or relief driver are provided in a truck cab equipped with an adjustable seat which allows the sleeper to recline in a position parallel to the movement of the truck and in a space where there is good ventilation. Such sleeping quarters are preferable to the stuffy shelf or cubby-hole, set at right angles to the truck, where a relief driver usually sleeps. The berth is made in two sections, one of which is a seat the back of which can be adjusted to any angle between the horizontal and vertical. The other section, which unfolds to form the foot and leg rest, is stored under the cowl out of the way when not in use. The berth is seventy-three inches long when fully extended, the back section being twenty-three inches wide while the front is sixteen and one-half inches in width. The sleeper does not interfere with the comfort or efficiency of the driver when being used as a seat or as a bed.

*Chief Relief to Hi Day
Athletic Director, Pasadena*

Col. Thos W. Sheridan
Little Neck, L.I.
N.Y.

Pests Used in the Study of Man's Heredity



D113
Top, Chart Used in Study of Flies; Right, Bottles in Which Pests Are Studied

Decided Millions of flies are being used by Dr. Calvin Bridges of the Carnegie Institute of Technology in his study of hereditary traits at California Institute of Technology. Resembling man in their ability to transmit physical characteristics, the flies are exposed to an X-ray that speeds up their development 150 times, enabling the study of thirty generations in one year.



strained at the hawsers of the "Nelson." Oil tanks and magazines were emptied and a dredger dug gravel from beneath the bow. As the tide rose, the combined efforts of crew, destroyers and tugs caused the "Nelson" to slip off the bank. "Sallying ship," as the crew's movement of jumping up and down is known, was employed long before the days of steam and steel ships. It consists usually of making the vessel roll heavily by having the crew run, all together, from side to side. At first the roll is very slight, but it gradually "builds up"



until the effect of a very heavy sea is simulated. This rolling breaks the suction of the mud or gravel in which a vessel may be stuck, literally bouncing the ship off the bottom for short periods and giving tugs and the ship's engines a chance to pull the vessel clear.

"SALLYING SHIP" HELPS FLOAT PRIDE OF BRITISH NAVY

D113 When the battleship "Nelson," pride of the British navy, went aground recently, the crew helped to refloat it by jumping up and down. The 1,300 men and 100 officers lined up astern and jumped up and down to the time beats of a bandmaster. At the same time, a flotilla of destroyers cooperated by racing at ever-increasing speeds past the ship to create a wash. Tugs

STEAM-DRIVEN MOTOR TRAIN BURNS COAL-TAR OIL

Germany is experimenting with a steam-driven motor train consisting of two articulated and streamlined coaches weighing less than 100 tons and seating 133 passengers. The train is driven by steam produced by two boilers of more than 1,700 pounds pressure. Each boiler has nearly

Reported by Frank Lester E. Clinard

200 square feet of heating surface and holds about eight gallons of water. These boilers furnish steam to a two-cylinder, compound engine developing 300 horsepower and turning 1,700 revolutions per minute. The waste steam is used to drive auxiliary machinery and is then precipitated in a condenser and returned to the boilers to be used again. The boilers are heated by coal-tar oil passed through automatic feeders and both boilers and engine are automatically controlled by temperature and pressure gauges. Propulsion is applied directly to the wheels, permitting the train to be driven forward or backward with equal facility. The train is offered as a competitor to the Diesel motor-driven trains, used extensively in Germany.

**POCKET MATCH HOLDER D 926
CONTAINS COMPASS**

Three vital needs for the woodsman are contained in one compact little case intended primarily as a holder for matches. The waterproof case has a compass built into the bottom and



Waterproof Match Holder with a Compass in the Bottom and a Burning Glass in the Top 1.00

the screw cover has a burning glass fitted into the top. It is made in bright colors, and will float if dropped into water.

Havally Products Co. Kansas City Times
Rochester, N.Y.



Curved Sideboard Which Utilizes the Corner Space to Advantage in the Small Dining Room

CURVED SIDEBOARD UTILIZES CORNER SPACE OF ROOM

Corner space in the small dining room can be utilized by using a curved sideboard, known as a "skane cabinet." Originally such furniture was used in Sweden, but the cabinet is now being produced in this country to take the place of the large sideboard where space is limited.

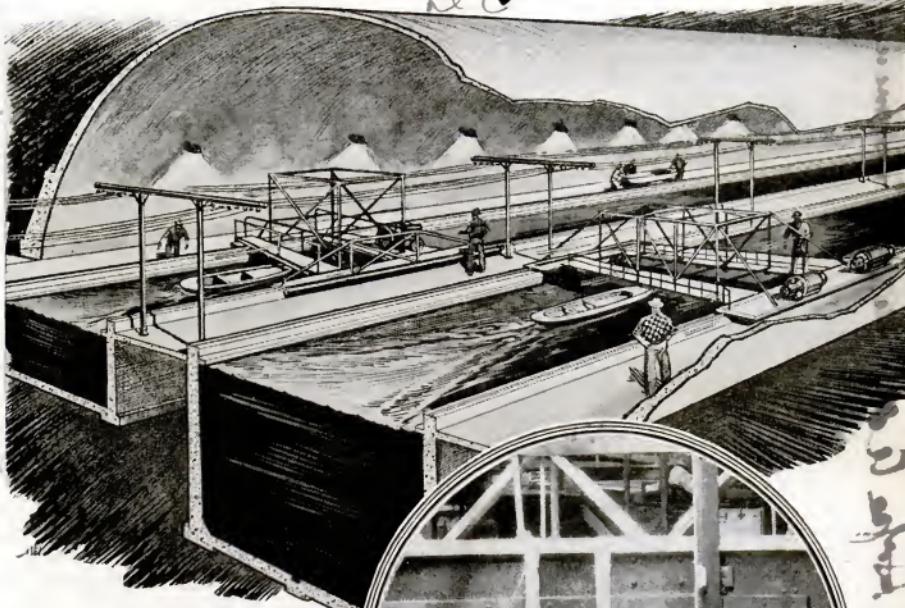
FEW THINGS DELAY THE MAIL D 28 FROM PROMPT DELIVERY

Blizzards and floods are the biggest problems of the United States post-office department in its attempt to deliver the mails promptly. When a letter is on a snow-bound train, or on a mail plane unable to take off on account of bad weather, it simply has to wait until the way is clear. However, these instances of delay are so rare that an inveterate letter writer might live a lifetime without having a single note go amiss, provided the address is somewhere near correct. Only a small fraction of one per cent of all the millions of pieces of mail handled annually is lost.

H. J. Cushman Mfg. Co., W.
North Remington, Vt.

0845 Cmt. Roger A. Jones
2901 Connecticut Avenue
Washington D.C.

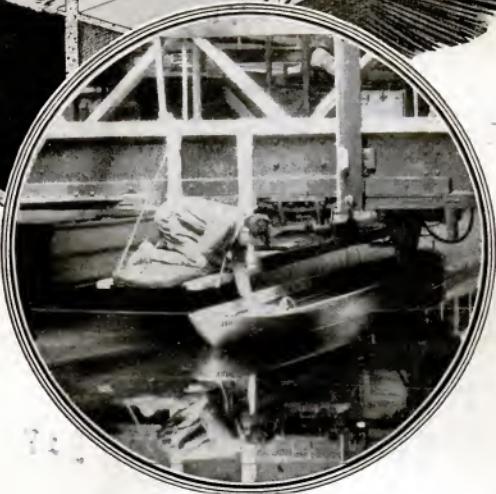
Proving SHIPS



IT is no longer necessary to gamble the lives of men to test the practicability of radically designed ships, nor to spend thousands of dollars in proving new shipbuilding theories. Model ships are built to scale and tests are made in specially designed basins.

There are but two testing basins in the United States, one at the University of Michigan and the other at Washington. The Washington basin is operated by the navy department which conducts tests for any American shipbuilder who has a designing problem and is prepared to pay the costs. The present basins have proved inadequate to handle the needed volume of work, so the Navy has surveyed a site and drawn plans for the largest experimental basin in the world to be located at Cabin John, Md., on the outskirts of Washington.

When the naval architect and marine engineer are called upon to design a ship



General Diagram of Navy's Ship Model Testing Basin and Model Attached to the Towing Carriage

which shall fulfill certain requirements their problem is twofold. They must first design a vessel which will meet within a reasonable margin the specified performance and they must limit the power, fuel consumption and initial cost of design to figures which will not handicap the ship when competing with other ships built to give the same performance.

*Cmt Edgar M Jones
2901 Connecticut Ave D845
Washington, D.C. 20008*

in TANKS



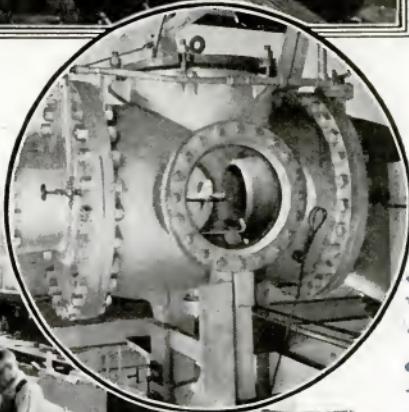
Right, View of Towing Dynamometer, Showing the Chronograph Drum Recorder



Models are made of wood. The exterior of the model represents the external shape of the vessel. The model is towed by a carriage which spans the basin and runs on rails at each side. A dynamometer, an instrument as delicate as a druggist's scales, is



Tunnel Where Propeller Models Are Tested and Shop Where Wood Models Are Made



placed inside the model. This instrument operates with a series of weights and springs so that changing conditions of resistance are recorded immediately.

Neither can the characteristics of a propeller be satisfactorily determined by es-



D 245
timate or calculation. It is customary to obtain information by running the propeller alone in open or undisturbed water in the model basin.

Loss of efficiency in a ship after short service has been blamed on cavitation due to faults developed in the propellers. Cavitation is a condition of the water failing to completely close in behind a vessel, causing a decrease in the pressure against the propeller blades. It is thought that cavitation is by no means confined to propellers. It may and does occur around hubs, struts, and behind the plate laps of the hull. Much of the severe and annoying ship vibration is lumped together and thoughtlessly ascribed to the propellers.

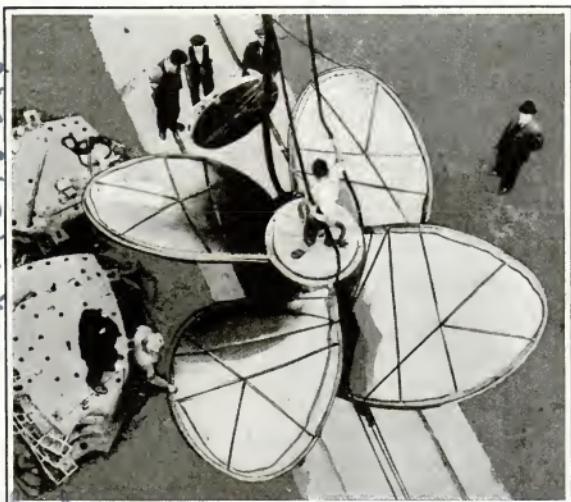
To determine ways to minimize the development of cavitation and to study propellers in action there has been constructed a variable pressure water tunnel at the experimental basin. By placing model propellers in a stream of water circulating within a tunnel, high speeds can be developed safely and yet permit observation through glass ports. The performance of models of chipped and dented propellers has proved that keeping propellers smooth and true, especially in a high speed ves-

sel, is a matter to be treated with respect.

Wind resistance against the superstructure of a ship affects the vessel's speed, and in the last few years tests have been made to determine the amount of this resistance and how to overcome it. Models for tests of this type have a superstructure and are run like those for other tests except that the model floats bottom up. The resistance offered by water as the model is towed in the basin is converted into data on resistance by air.

Turning tests for naval ship models have acquired much importance since the world war. Admiral Scheer of the German fleet, at the battle of Jutland saved his ships by the narrowest of margins when his fleet performed a feat of turning right about in 180 degrees and completely outwitted and bewildered their British opponents. In naval maneuvers the turning ability of a ship is extremely valuable. Ships have to take a new direction at an exact location in relation to the rest of the fleet. The maneuver executed by Admiral Scheer's fleet would only be tried at the most critical of times but if his ships had not had the ability to make short turns, all would have been lost in the face of a superior fleet.

D 221 "Four-Leaf Clover" Propeller to Drive Giant Liner "534"



One of the Huge "Four-Leaf Clover" Propellers Which Will Drive the Latest British Liner; It Weighs More Than Thirty-Five Tons

Queen Mary
One of the giant propellers has been completed for the great liner now under construction in England and known only as the "534." This propeller, one of four which will drive the craft, looks like a huge four-leaf clover. It is made of manganese, weighs more than thirty-five tons and is nineteen and one-half feet from blade tip to blade tip.

Names and addresses of dealers in articles described, and any other details in our possession, will be furnished by our Bureau of Information upon request, accompanied by postage.

*See May 1934 - 690
Jan 1932 - March 1934 - 326
Aug 1932*

Arc-Welded Steel Freighter Has No Rivets



D843
Arc-Welded Steel Freighter 214 Feet Long Which Can Be Converted into a Tanker of 300,000 Gallons Capacity; the Boat Has Fourteen Self-Cleaning Hoppers and Is Self-Unloading

Built for Great Lakes, barge canal and coastwise service, an all-welded steel freighter, "Dolomite," is attracting the attention of the shipping world in its first season. Its hull is built of twelve-inch channels formed in U-shapes and welded together. There is not a rivet in the ship. It is 214 feet long and propelled by Diesel engines. Early this spring the "Dolomite" hit a submerged wall while traveling six miles per hour without denting the prow. The ship is of the semi-submersible type, permitting increase in draft when entering the barge canal and thus facilitating its passage under low bridges. The "Dolomite" can be converted into a tanker within three hours and can take on 300,000 gallons of gasoline or other liquids. The boat, which is self-unloading, was not constructed in a shipyard. Practically no tools were used other than a crane, an electric winch, an air compressor, cutting apparatus and seven arc-welding machines. The channels were bent cold with homemade equipment. All welding was

done by the shielded arc process, using equipment manufactured by the Lincoln Electric company, of Ohio.

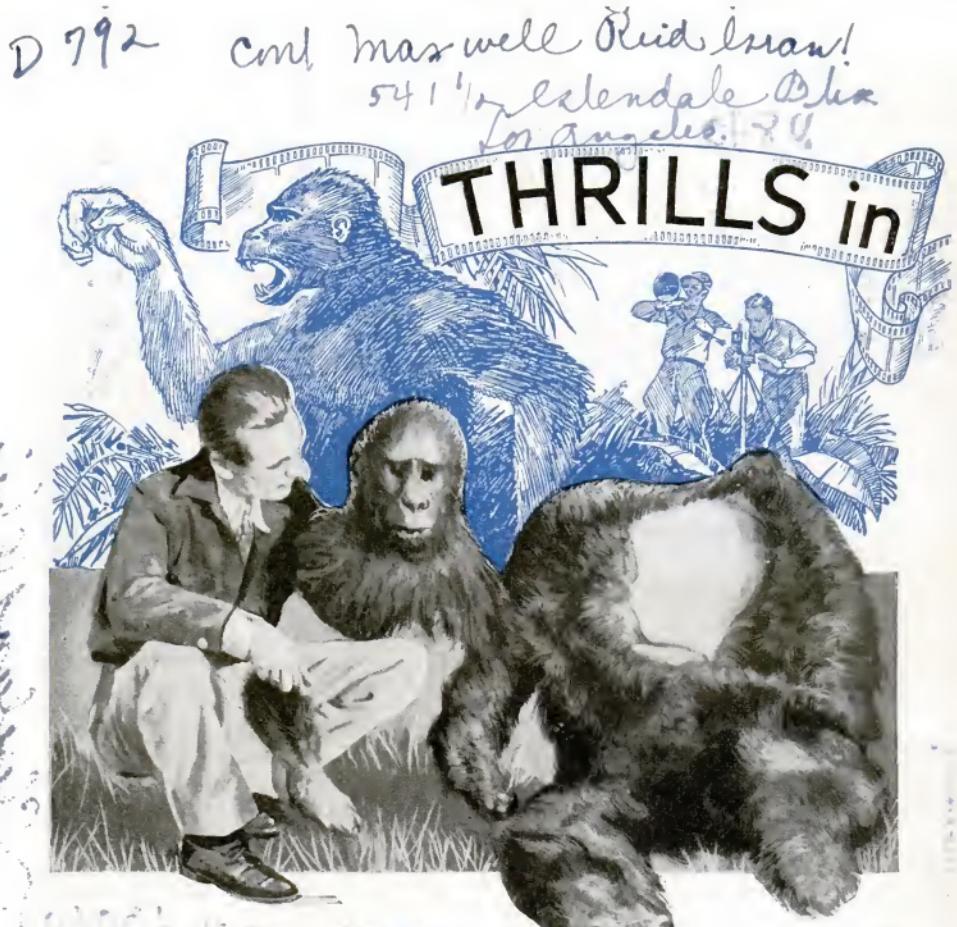
D850. Cort Road 13010
**BOOK ENDS WITH ZIPPER BASE
HOLD FIRMLY IN PLACE**

Adjustable to hold varying numbers of books, a new rack is equipped with a "zipper" base. The rack consists of two book ends of black walnut or mahogany on a base of similar wood. On the under side of the base, which is slit down the middle, are two corrugated metal strips, running parallel to the slit. Each book end is fas-



tened to small blocks of wood that move back and forth in grooves on the metal strips, zipper fashion. When set at the position desired, the ends hold firmly.

*H J Slumber
Waterville, d row*



SNORTING.tugs nosed a burning ocean liner into port the other day. Fireboats raced to extinguish the smouldering remnants of a freighter that had almost gutted the vessel.

As the gangplank vibrated, a man darted across to the dock. Under his arm was a little leather case containing two reels of narrow-gauge movie film. A few hours later, airplanes were rushing a pictorial record of the sensational battle with fire at sea to all parts of the country. An amateur cameraman had scooped the world!

Every now and then a big story breaks, miles away from the nearest newsreel crew. The lucky amateur photographer

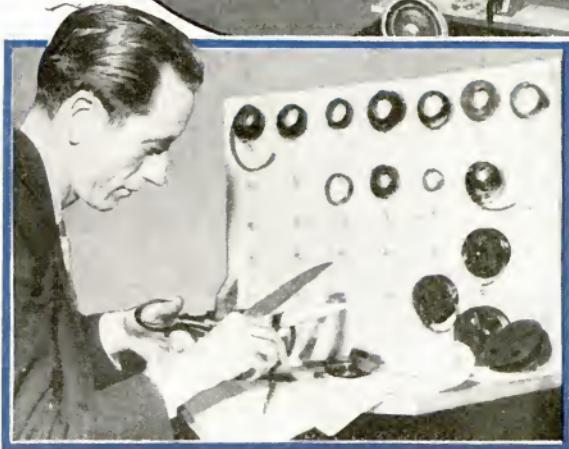
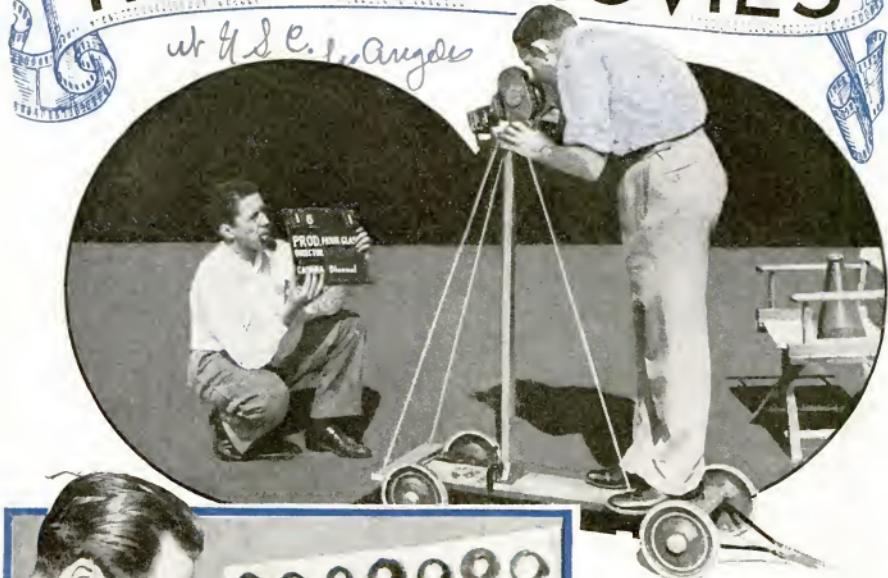


Gorilla Suit for Home Movie Film; It Is Made from a Bearskin Rug and Head Is Carved from Crude Rubber; Below, Amateur Movie Making

D 792.177

Homemade MOVIES

W. G. C. Los Angeles



Above, Using a Homemade "Slate" to Record the Number of a Shot; Below, Editing Film at a Homemade Board

who happens to be on hand with his movie camera has the chance to make a "scoop" which may pay him handsomely. Newsreel companies are anxious to buy exclusive pictures of big news events missed by the regular news gatherers, and pay as much as a dollar per foot, or two dollars for foreign subjects.

Not only newsreels, but also feature pic-

tures and comedies are being produced by amateur movie enthusiasts, using improvised "props" and homemade equipment. More than a million sixteen-millimeter cine cameras are in use in the United States. Prizes are offered by clubs and by a national association, for outstanding amateur pictures. So many good ones are being filmed that a new company plans to buy and distribute amateur eight-reel features and two-reel comedies, paying on a royalty basis or buying them outright.

Two amateurs won a national contest last year with their film, "Tarzan, Jr.", shot in a boys' summer camp of which they had charge. Eighty boys ranging from eight to eighteen were in the cast.

"Animals of every kind figured in our scenario," said William Palmer, one of the amateur producers, "and we had to resort to many tricks. A partially submerged log,

W. G. Seaman
Los Angeles, Calif.

D 792
Campus movie at V.J.C.



Amateur Movie Company in Action; Below, Shooting an Interior Scene for an Amateur Production

propelled across the river by hidden wires, realistically played alligator. The hippo was an overturned canoe, its head shaped from chicken wire and covered with a sack. We rented a 'monkey' suit with interchangeable mask, so the boy who wore it could represent either a monkey or a lion. The boys painted whitewash stripes on a horse to convert it into a zebra. When they had finished, they discovered that on one side the stripes ran vertical; on the other, horizontal!

"Handling our animal actors was our biggest problem. A pet police dog was required to drive away a thief by springing at his throat, but the dog was gentle and steadfastly refused to attack his friends. Camera trickery solved our problem. The 'thief' on horseback held the dog up to his shoulders as if it were attacking him. Then he tossed the dog lightly to the ground. When the film was run backward in projection, the dog seemed to leap up at the rider."

In the home-produced photoplays, strategy and mechanical ingenuity take the place of costly equipment and high-priced talent. Ambitious amateurs spare no pains in attempting to achieve professional effects. Many of the nation's 300 cine clubs have formed themselves into miniature movie companies. Amateur scenario writers huddle over scripts to produce continuities for shooting. Amateur directors wield megaphones and learn to handle mob scenes by actual practice. Technical work is divided among members of the camera crew, with cameramen, cutters, editors, and property men.

D992

D858. Curt Berger,

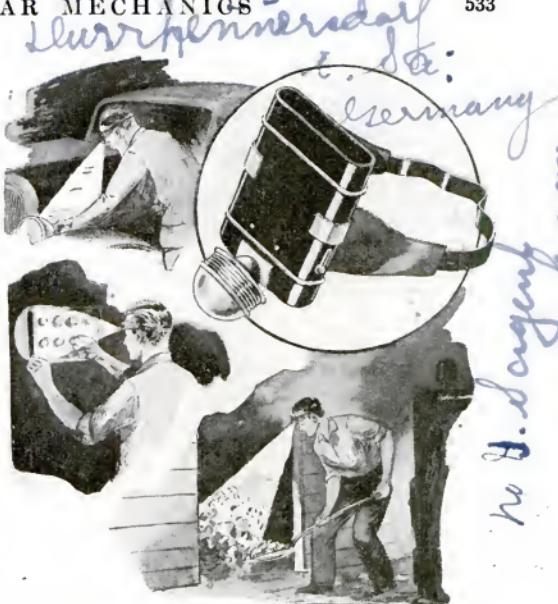
At the University of Southern California, students in the department of cinematography produce feature pictures on a regular schedule. Newsreel cameramen cover important campus events with a weekly news release, shown at student assemblies. The amateur production company often goes "on location."

Miniature models ingeniously constructed duplicate many professional effects. Slow motion or fast, as occasion demands, aids realism. For example, a toy locomotive can be used to stage railroad wrecks, if the camera is cranked fast, so that the wheels do not spin too dizzily or the train lurch unnaturally.

Some amateurs make cartoon comedies like the Mickey Mouse pictures. Since even a short cartoon requires thousands of drawings, they use a "master drawing" as a basis, tracing the separate drawings from it, and making the necessary changes to show movement. Color is sometimes added for special effects—dark blue for night scenes, red for fires—simply by placing a disk of colored gelatin into the projector along with the film. Or, the film itself may be tinted with special dyes. Some amateurs have even made talkies, shooting the picture silent and later adding sound on home-recorded phonograph disks.

Travelogues, nature studies, and scientific features add variety to the home-movie menu. A Los Angeles banker noticed that rats would climb a tree in his yard to steal food placed there for a bird. Placing a remote-controlled movie camera in the tree, he secured interesting action pictures of the thieving rodents.

A Berkeley, Calif., amateur recently showed club members fascinating movies of life under the microscope, photographed with his miniature camera, and climaxing with a scene showing a deadly Protozoa, magnified to 1,000 diameters. One amateur has made himself a walking newsreel reporter by getting an oversize vest, with pockets to fit lenses, filters, and extra reels of film. This cine jacket is worn over an ordinary vest and under his regular coat.



Pocket Flash Lamp Which Can Be Worn on the Head or Converted into a Table Light

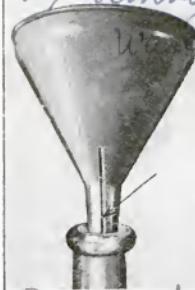
POCKET LAMP WITH HEADBAND LEAVES HANDS FREE

Equipped with a headband so that it may be worn on the head, leaving the hands free, a pocket lamp introduced in Germany has many uses. An adjustable reflector gives the operator control over the degree of illumination desired. Removal of the headband converts the lamp to a pocket light, while another adjustment converts it into a table lamp.

D890

FUNNEL WITH AIR GROOVE PERMITS FAST POURING

10X Bonus



Liquids may be poured rapidly through a new funnel constructed with a shallow groove down the side. The groove permits air to escape from the bottle into which the liquid is poured. The funnel is unbreakable.

Bryant Electrical



Bulletproof Shield for Use of Police Officers; It Can Be Handled Easily by One Man

ONE-MAN BULLETPROOF SHIELD USED IN WAR ON CRIME

For the protection of policemen battling criminals who are armed with machine guns or heavy revolvers, a one-man bulletproof shield has been devised recently by the Los Angeles, Calif., police department. Made of two pieces of bulletproof metal, it weighs only twenty-five pounds. The shield is six feet long when ready for use, but can be folded to three feet for carrying. Loops and hand grips facilitate its handling with one hand while the policeman fires his revolver through either of two apertures fitted with caps that close when the gun is withdrawn. Full vision is possible through a three-inch opening covered with bulletproof glass.

A "cold light" lamp enabling physicians to see through tissues clearly is expected to be valuable in diagnosing cancer.

ELECTRIC EYE COUNTS AUTOS BUT IGNORES PEDESTRIANS

Electric eyes, or photo-electric cells, count and record the automobiles entering the grounds of the Massachusetts Institute of Technology but ignore all pedestrians who pass by. Two light beams several feet apart are focused on two photo-sensitive cells and a counting relay registers each time both beams are interrupted by the passing of a large object like a car. Pedestrians shield but one light at a time and hence are not counted. A slight change permits the device to measure the speed of cars by noting the very small time between the interruption of the two light beams. For this purpose a mechanism for measuring minute time intervals is connected with the electric eyes.

COMPACT ROLLING RESTAURANT IS MADE OF ALUMINUM

Constructed of light aluminum alloys and mounted on rubber tires, a compact lunch wagon as complete as a modern kitchen is helping to solve the noonday food problem for people whose time for eating is limited. One man can manipulate the wagon, which weighs 425 pounds. There are twenty-seven compartments, including one for pies, a five and one-half gallon coffee urn and a four and one-half gallon



Compact Lunch Wagon Made of Aluminum and Containing Twenty-Seven Separate Compartments

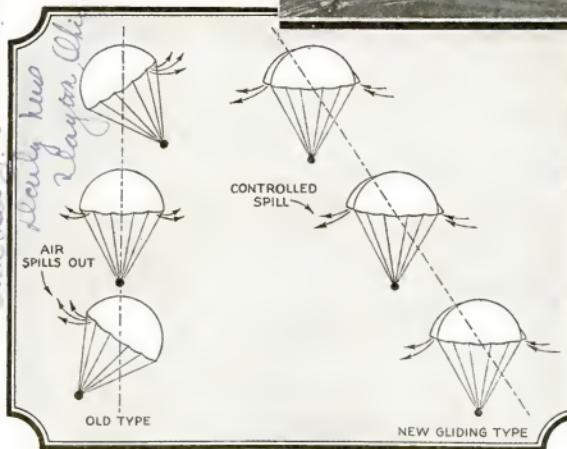
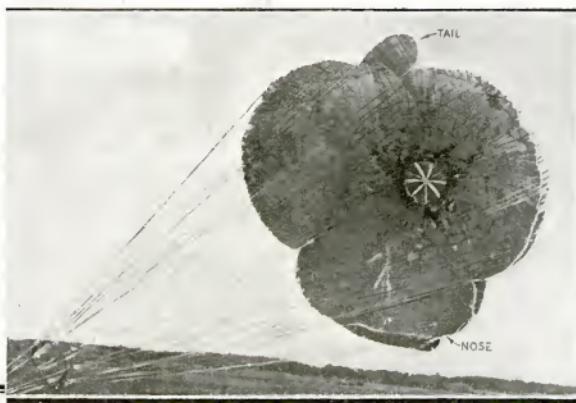
insulated container. A hinged cover provides protection for food in the upper compartments.

*Aluminum Company
of America, 1356 Penn
Bldg., Pittsburgh, Pa.*

Cont: Charles Bauer Writer Dayton

Gliding Parachute Lowers Balloon Gondola

Recent attempted or contemplated balloon flights to the stratosphere have resulted in the development of a huge parachute capable of lowering the spherical gondola of such a balloon safely to earth in case the craft encounters trouble. The parachute is eighty feet in diameter, its depth is fifteen feet and the length of each of its 184 ropes is eighty feet. It is triangular.



Triangular Parachute, and Diagram Showing It Gliding Instead of Descending Vertically

equipped with a smaller pilot chute but depends on its size and form of packing to open properly. It is claimed such a parachute can lower the gondola of a stratosphere balloon from a height of 40,000 feet without injuring the occupants or the instruments of the sphere. In its latest form, the parachute has a nose for biting into the air and a vent at the other side to permit imprisoned air to es-

lar, its three curved sides resembling a big three-leaf clover when viewed from below. The folded pack of the parachute is not

cape, thus imparting a gliding effect which permits the descending body to fall at a steerable tangent to the earth's surface.

D89!

Holder for House Numbers Also Serves Other Purposes

Designed for displaying house numbers, a convenient holder also may be used for street and road signs and for displays on the lawn. Removing a bolt at one end permits the numbers or letters to slide out.

Projected air conditioning of deep gold mines in South Africa is expected to increase production by making it possible for miners to work at greater depths.



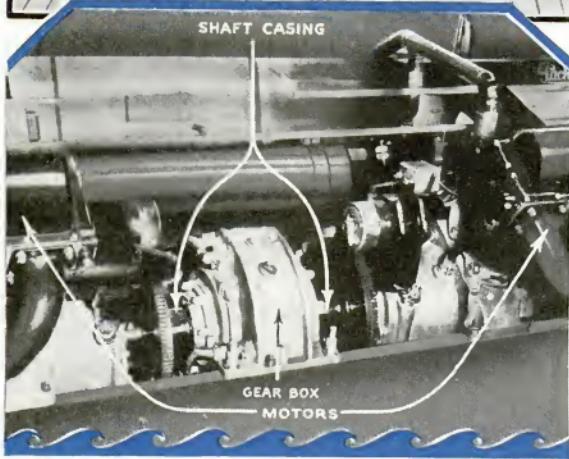
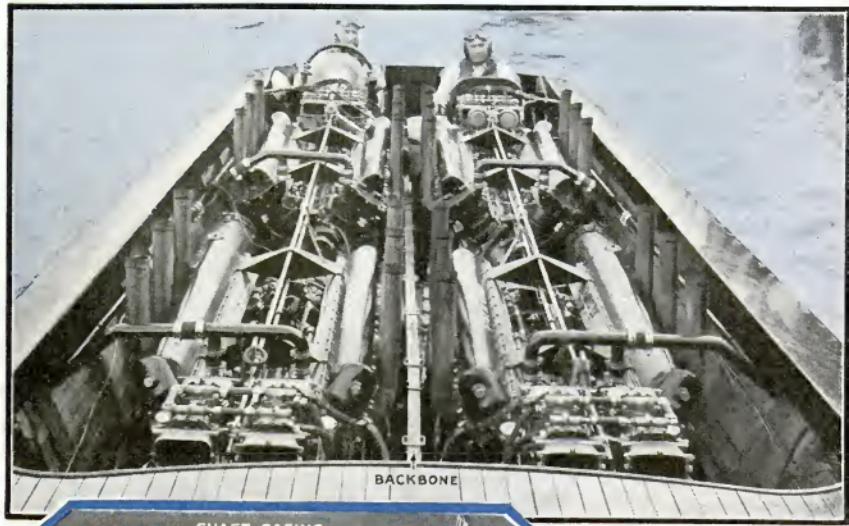
Holder for House Numbers or Road Signs

J. P. L. Stalder
Engineer Edg. Clin. and Co.

D812.

Com Harry L. Blue,
The Detroit News
Detroit, Mich.

The GADGET



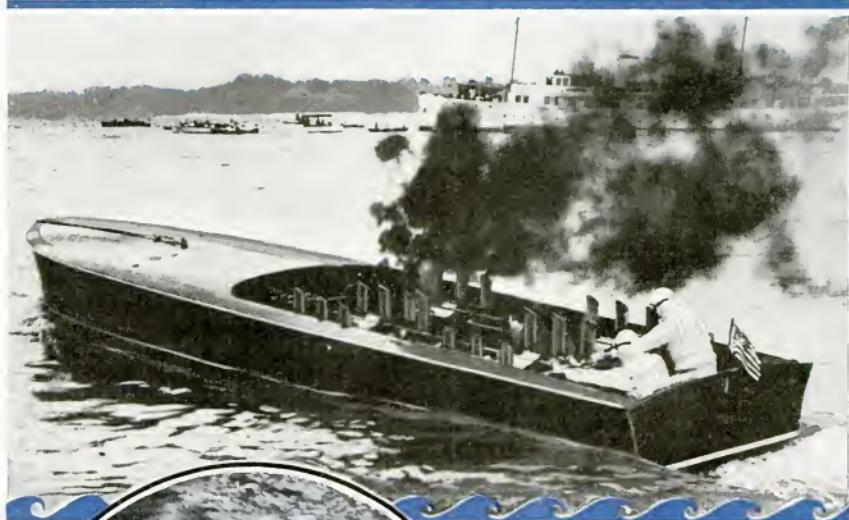
Engines and Gear-Box Arrangement of Miss America X; Note Timber, Above, Running Length of Boat to Form Its Backbone

GAR WOOD had been suggested as the Gadget King of America. The appellation was taken to Algonac, Mich., to the Wood experimental plant with the thought that the crown might be accepted, a coronation held and, too, that perhaps the Gadget King of America might have some

news to divulge on a new and faster and more gadgeted Miss America. The fifty-four-year-old, white-haired wizard of Michigan, who holds the world record for speed on water and the Harmsworth Trophy that England eight times has tried and failed to take away from him, was on the dock in front of the plant in which all the Miss Americas have been built. Moored to the dock was a strange-looking power craft—a high-speed, pilotless target ship, controlled by a gyroscope and compressed-air cyl-

D 8/2

KING of AMERICA



Above, How Miss America X Looks When Starter Buttons Are Pressed; Below, the Racer Hits Her Stride

faster than four or five-mile-an-hour tugs for the towing of targets in gunnery practice. Wood made the target and war department experts authorized the purchase of one for trial purposes.

After Wood had shown that the pilotless boat could run forty miles an hour even on a rough river and hold its course without hand of man on either throttle or helm, he was interested in a discussion of things he has devised.

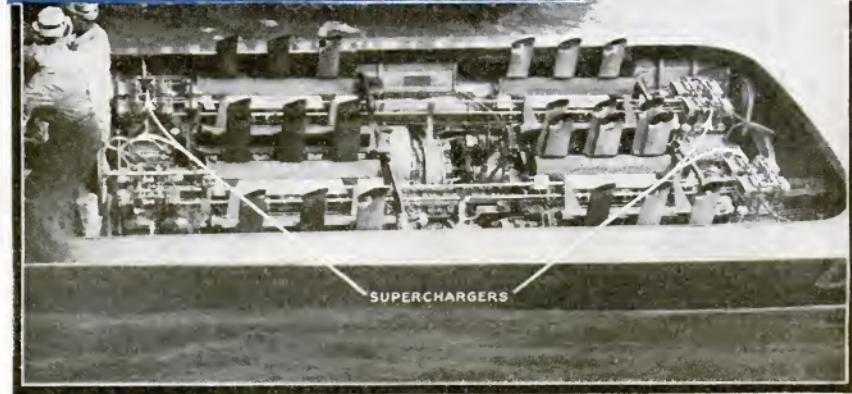
The title, Gadget King of America, was mentioned.

"I don't know what you mean by that," he laughed. "Gadgets aren't things produced and proved by laboratory tests and practical demonstrations. Gadgets are—well, here I'll show you one."

Wood walked over to a twelve-cylinder car. He removed from the dashboard an attractive, nickled object that was about three inches long.

"It's an automatic cigarette lighter," he explained, "it lights and

D 82



Above, Crew of Expert Mechanics Making a Last Minute Check-Up of Every Detail of Miss America X Before a Race; Below, the Big Power Plant and the Four Superchargers

breathes, inhaling and exhaling, just as you do. All you do is put your cigaret in it, press a button and your cigaret is lighted and puffed on until you take it out. Saves you taking your eyes off the road while driving eighty or ninety miles an

hour. It's just a gadget but I think I'll have it patented."

But the Miss America, were there not a lot of gadgets on her? Didn't gadgets play a large part in the final perfection attained in the assembly of four motors having a total of 6,400 horsepower?

"Not on your life," Gar replied emphatically. "The Miss America X is the result of long research, of many painstaking laboratory experiments and of repeated practical tests.

"I am not denying that there are gadgets here and there that fulfil their purposes, I would even call the self-bailers on the boat a 'gadget idea'—

but the principal reasons for Miss America X's success lie in the gear-box assembly and the boat's variable step."

The gear-box assembly was the accomplishment of Wood's that astounded Detroit's gas-engine technicians. In powering

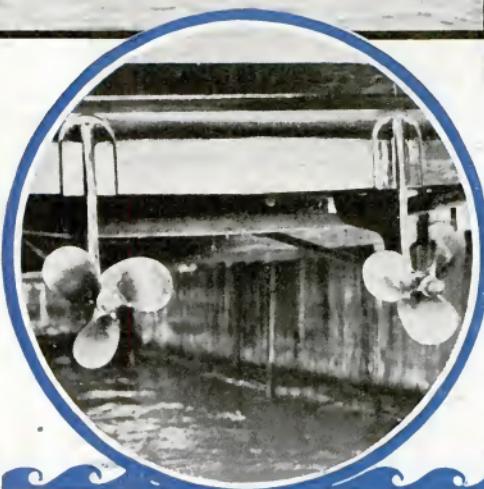
D 812



Miss America X it was Wood's idea to use four twelve-cylinder motors not as four distinct motors but as two power plants. He wanted them in banks, two in line on the starboard side and two in line on the port side. Four motors had been hooked together before but with clutches between and the gear boxes forward.

This arrangement required dangerously long propeller shafts at the speeds Miss America's propeller wheels were to be turned. Wood wanted the gear boxes in the middle of the banks, giving his boat short, sturdy shafts that would stand the strain. In effect, what Wood wanted was to make two motors function as a single unit, with the crankshafts of each bank synchronized and turning as one shaft! Engineers said the oscillations of the shafts would be so great as to wreck the gear boxes with the motors running at any appreciable speed. But Wood stuck to his idea which was to spline the engine shafts in each bank in a specially designed and specially constructed gear box. Each gear box was to be the heart of each tandem, with two shafts fitting into a main driving gear through a splined hub which was common to both. And it worked.

"You wouldn't call those gear boxes gadgets," said Wood. "I was sure I was right but it was never done before and



Above, Note How Bow Is Up and Stern Is Down at High Speed; Below, the Propellers of Miss America X

nothing is ever proved until it is done. Don't forget that the strain of 3,200 horsepower was on each gear box. It had to hold together. The case of each box was reinforced by steel rods of high tensile strength with a turnbuckle attachment."

Wood explained that the crankshafts turned through oil-sealed vents in twelve-inch races containing specially made bearings, each bearing "as big as a golf ball." The shafts were made of a specially heat-treated chrome-vanadium steel with a tensile strength of 260,000 pounds to the

(Continued to page 124A)

D 85

540

POPULAR MECHANICS

11/8/40 (Harbes Garage
165 Main St.
Winnipeg, Man., Canada)

AUTO EXHAUST GAS MADE SAFE

BY FUEL VAPORIZER

Pend. \$10.00

Fatal properties of automobile exhaust gases are said to be eliminated by a fuel vaporizer that is attached between the carburetor and the intake manifold. The amount of carbon monoxide, the dangerous element in exhaust gas, is reduced from forty per cent to two per cent by the device, according to the maker. This percentage is not considered fatal. The device consists of a heavy brass casting, the inner side of which is machined with a channel cut in it. The channel is filled with a porous chemical mixture which minimizes the fatal properties of the exhaust gas.

D 872

MILK FOR QUINTUPLETS COOLED IN KEROSENE REFRIGERATOR

When quintuplets were born to the Dionne family a few months ago in a small farmhouse in the Canadian north woods, one of the first problems to be faced in caring for them was how to cool the human milk which it was necessary to bring to the remote home to keep the babies alive. There was no ice available and the home was without electricity or natural



Plaster Spray Gun Which Applies a Uniform Coating and Gives a Smooth and Even Finish

SPRAY GUN APPLIES PLASTER IN UNIFORM COATINGS

Durable and easy to operate, a plaster spray gun developed in Germany applies the mortar in uniform coatings, resulting in the smooth finish desired by architects and builders. A rubber roller clad with steel combs agitates the mortar to give it uniform consistency. Rubber bearings prevent the mortar from clogging the spray. Its makers claim a large saving in materials from its use.

SMALL SOLDERING IRON USES ELECTRIC PLUG AS HANDLE



While supplying the power, an ordinary electric plug, such as used for an electric iron, serves as the handle for a small soldering iron now on the market. The prongs of the iron fit into the holes in the plug, which is then used as the handle.



Refrigerator Operated on Kerosene Used to Cool the Milk Fed to Quintuplets in Canada

gas. The problem was solved by a manufacturer of refrigerators using natural gas to start the refrigerating cycle. One of these refrigerators was rushed to the Dionne home and was operated by using kerosene instead of gas.

Electrolux Refrigerator
Sales. 51 £ 42 ns

Letter
reld
W.C. Vogel Nachf. Inc.
Kamitz & Ha
Germany

no longer holds. Messrs Engle Vogel Nachf. Inc.
D 11/9/40

W.C. Vogel Nachf. Inc.
Kamitz & Ha
Germany

D 842 - *Standard Salt Products Co.*

Box 2419, Tulsa, Okla.

POPULAR MECHANICS

541

Salt Well Taps Ocean of Brine Useful to Man

When one group of Oklahoma drillers started sinking a well, they tried to avoid striking oil. Success marked their efforts and at 3,500 feet, the well tapped an ocean of brine. Today, millions of gallons of natural brine are being brought to the surface to be converted into high-grade salts and other products. This particular brine is almost completely free from undesirable elements common to saline solutions taken from the earth, "gypsum" or calcium sulphate being absent. Day to day tests show that the brine is about 99.85 per cent pure

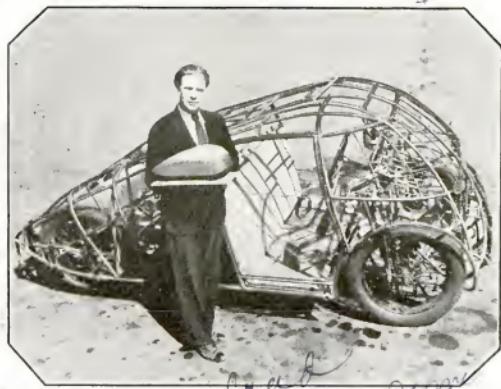
salt. Heat necessary to evaporate the water in the brine is obtained by circulating the brine, direct from the well, over the hot coils of a refinery near by, coils which otherwise would have to be cooled by using cold water. Geologists estimate that



Well Which Pumps Natural Brine to Surface Where It Is Converted into High-Grade Salt and Other Useful Products

there are more than one and one-half billion cubic feet of brine under each mile of surface at that particular spot, or approximately sixty million tons of brine from which ten million tons of salt may be taken, literally an ocean of brine.

D 857 High-Speed Streamlined Car Has a Motorcycle Engine



Small Streamlined Automobile Powered with a Motorcycle Engine; Wheels Are Independently Sprung

Constructed of steel tubing molded to shape with a blowtorch, a 700-pound streamlined automobile has been produced

at Pasadena, Calif., after its design was carefully chosen in wind-tunnel tests. Estimated performance of the four-passenger car, which is equipped with a special motorcycle engine, are: 100-mile-per-hour speed, fifty to seventy miles per gallon of gasoline and 600 miles to one tank of fuel. No glass is used, the windshield being made of a transparent composition material. The car is fireproof and non-capsizable, its center of gravity being less than twenty inches from the road. The wheels, each of which is independently sprung, have a wide spread.

(Cysts which transmit amebic dysentery can be removed from water by the usual filtration methods, tests have shown.

John Galvin & Brothers
California Distributors

No plants present
for manufacturing
12/1/64

Articulated Motor Coach Train Climbs Alps



D892
Articulated Motor Coach "Train" Consisting of Two Units Joined by a "Concertina" Gangway; Only the Front Unit Is Motorized and the Conveyance Is Used in the Italian Alps

Intended for making trips through the Italian Alps, a type of articulated motor coach "train" was built and tested recently. It consists of two coach units joined by a "concertina" gangway which permits passengers to walk from one coach to the other while the train is in motion. Only the front coach is motorized, the rear one being a trailer. The design was made necessary to negotiate sharp turns and also because double-deck coaches were impractical for the mountain travel.

EGG COUNTER ON HEN'S WING KEEPES ACCURATE RECORD

D892
How many eggs a certain hen lays during trap-nesting periods can be recorded



Egg Counter to Be Attached to Chicken's Wing, Thus Offering an Accurate Record of Each Hen

accurately by a small metal counter that is attached to the hen's wing. As the nest is visited and the egg removed, the poultry-

man turns the small dial one notch, the counter recording the laying of another egg. One complete circuit of the outer disk registers twenty eggs, while the inner disk records in larger series, twenty, forty and so on. When the hen has laid 240 eggs, she is provided with a leg ring.

D878

WATER LOSS FROM RADIATOR ENDED BY SEALED COOLING

Containing two valves, a special filler cap for the automobile radiator increases the internal pressure of the cooling system and eliminates the constant addition of water. It also improves hot-water heater performance and high-altitude engine operation and reduces the loss of alcohol or other anti-freeze

solutions. The development, called sealed cooling, consists of a cap in the upper radiator tank which closes the overflow pipe under ordinary

operating conditions. Within the filler cap is a dual spring valve. The larger valve, equipped with a special sealing device, raises the internal pressure of the cooling system but releases fluid or vapor when internal pressures rise above three and one-half pounds per square inch. The inner and smaller valve eliminates undesirable vacuum. The sealing action raises the boiling point of water from 212 to about 225 degrees so the loss of water through the formation of steam and vapor is reduced to a minimum. The relatively low boiling point of alcohol is also raised when this liquid is used as an anti-freeze.



no longer made
1/18/40

Cont. Richard
2047 N. Park Ave
POPULAR MECHANICS
Philadelphia

Coat. H. Miller
Box 21, Station C
Portland Ore

543

PEARLS FOUND IN AMERICA ARE SHIPPED TO ORIENT

Pearls have so long been considered as Oriental jewels that it will surprise many to learn that specimens from the United States have been sent to Europe and even to the Orient. The famous "Queen Pearl," valued at \$10,000 and now the property of an East Indian ruler, was found near Paterson, N. J. Pearls are found in mollusks in Maine, New Jersey, New York, Pennsylvania and the Mississippi valley. Artificial pearls are made in France from guanine, a pearl essence obtained from the scales of large herring.

D 873 DETECTOR FINDS GAS LEAKS AND SPEEDS REPAIRS

Leaks in gas pipes are detected quickly by a device similar to a stethoscope. Vibrations set up by the escaping gas are picked up by the detector and carried to the operator's ears by a set of headphones. The detector is attached directly to the pipe. Vibrations from a three-foot-per-hour leak in a one-inch pipe can be heard forty feet away. Quick detection of small leaks speeds up the work of repairmen.



D 873
Detector Like a Stethoscope Which Quickly Locates Leaks in Gas Lines and Speeds Up Repairs

D 882 HUGE LATHE ON ITS OWN TRACK TURNS OUT GIANT MASTS

Trees as long as 150 feet are turned into giant flagpoles, radio tower supports or ship masts on a huge lathe that runs on a



B 873
Big Lathe Running on Its Own Track and Converting a Big Tree into a Lofty Flagpole

small railroad track. As the tree revolves, the lathe creeps along trimming the great trunk to size. An electric motor drives the trimming knives, eliminating the old hand method of hewing the tree. The lathe does the job in one-tenth the time formerly required.

D 853

ELECTRIC STAMP SEARS PAPER AND PREVENTS FORGERY

Imprinting a clear, brown signature or symbol on paper, an electrical stamp is operated without ink. The handle contains a filament resistance for the small current, which is taken from an electrical outlet by a plug-in socket. A small regulator prevents overheating of the metal characters



on the stamp face, saving the paper from being burned. After being placed on a document requiring the stamp, a push-button in the handle is pressed to switch on the current. Almost instantly, the imprint of the stamp is seared into the paper.

D 853
Box 5718, Homewood
Station, Pittsburgh Pa

Edgar Darts
Mederoy School
McGibbney
Lemmonia



Home
Homemade Gold-Mining "Machine" Consisting of Gallon Cans
Attached to a Paddle Wheel

GOLD SLUICING WHEEL LIFTS WATER TO WASH PAY DIRT

Two Oregon school boys who have an inventive turn of mind are now sluicing from two to four dollars worth of gold per day from a small stream in that state with the aid of a homemade gold-mining "machine." Their invention consists of a paddle wheel with gallon cans attached to the paddles to carry the water to the tops of troughs and thence to shore where it is emptied into the sluice boxes into which the lads shovel the gold-bearing gravel. The pay dirt is recovered from the riffles in the sluice boxes.

D 401 SPEED OF LIGHTNING

Using a camera with two lenses revolving in a circle at opposite ends of a diameter, two experimenters photographed a number of lightning strokes between earth and cloud in an effort to deter-

mine the speed at which a thunderbolt travels. The lenses revolved at 1,500 revolutions per minute. Almost always, the experimenters found, the main flash was preceded by a faint "leader" which traveled from the negatively charged cloud to the positively charged earth at 810 to 19,900 miles per second. The main flash, from earth to cloud, traveled at 14,900 to 68,400 miles per second, the average being 28,500. The experiments were conducted for the South African Institute of Electrical Engineers.

D 879

BIG WREN INDICATES RADIO STATION

Radio station WREN at Lawrence, Kans., indicates its name with a huge wren erected at the entrance. The bird is of concrete and weighs about 1,500 pounds. The legs are of heavy steel and extend into the body. The body is made of a steel framework covered with metal lath, over which are two inches of cement built up like plaster. A sculptor modeled the outer surface which was painted in natural colors. The tip of the tail is about seven feet high.



Big Wren That Personifies the Name of Radio Station WREN

D855 Schirmer Schmidt, 19 March

POPULAR MECHANICS

545

Floating Ball with Paddles Propels Swimmer

Buoyant enough to support the weight of one man, a new water-sport device is popular at German resorts. It consists of an air-filled ball with a short oar or paddle on each side. With its aid, a person can stroke through the water as though he were swimming, the ball supporting his weight. The apparatus has a floating seat for resting when the user becomes tired.

FERTILIZER FOR LAKE PLANTS MAY AID GROWTH OF FISH

Larger and more fish may be produced by using farm fertilizer in lake water, it is reported in connection with tests being conducted in Wisconsin. The fish do not eat the phosphorus and lime contained in the fertilizer. The gain in fish, both in size and in number, comes by the indirect route of first giving the fertilizer to the marine plants and then letting the



Air-Filled Ball with Paddle Attached Which Is Used to Support or Propel Swimmer

eight years. The cost for a whole summer of work in money spent for fertilizers amounts to only eighty-six cents an acre of lake surface.

fish eat the plants. Experimenters point out that many lakes do not have enough food for even the few fish survivors found in them. If such bodies of water are restocked with fish, these fish cannot find food, resulting in either death by starvation or a retardation of growth to the extent that it would take many years to attain legal size. Tests were begun in 1932 at Weber lake, after the United States bureau of fisheries had found that additions of lime and phosphorus would work in small fish ponds. After adding the farm fertilizers, certain plants in the lake suddenly bloomed after failing to bloom for

D847 ALUMINUM HOLDER FOR BAIT FASTENS TO FISHING ROD

For the angler who likes to fish in places not easily accessible, a bait holder has been developed which is attached quickly to the fishing rod. It is a light, aluminum box in which a worm, hook or fly is safe from damage. A rod so equipped can be tossed into a car without thought of harm to the bait.



Prof. A. Berge and
Mr. C. Juday Univ.
of Wisconsin

Dr. E. Norton
Lewiston, Maine

one made in U.S.
Cleveland. paddle ball. Infy Co

D793

Cml. C. J. Salmar,
c/o The Pictographs Co.
Box 840, Washington, D.C.

Things that LIGHTNING



LIGHTNING performs many strange antics, but not all the capers attributed to it in all seriousness. For example, it does not make "fairy rings" on lawns and meadows, it does not impress photographic images of leaves and trees on the human skin and it does not smite the earth in the form of solid thunderbolts or thunderstones.

One popular belief, that lightning never strikes the same place twice, has been disproved definitely. Still another, that lightning is a single flash of high-voltage electricity between cloud and earth, has been found erroneous. Engineers of General Electric's laboratory staff—men who toy

Top, Brilliant Display of Lightning; Center, Tree in Flames after Being Struck; Bottom, "Fairy Ring," Once Blamed on Lightning

D 793

DOES... and Doesn't



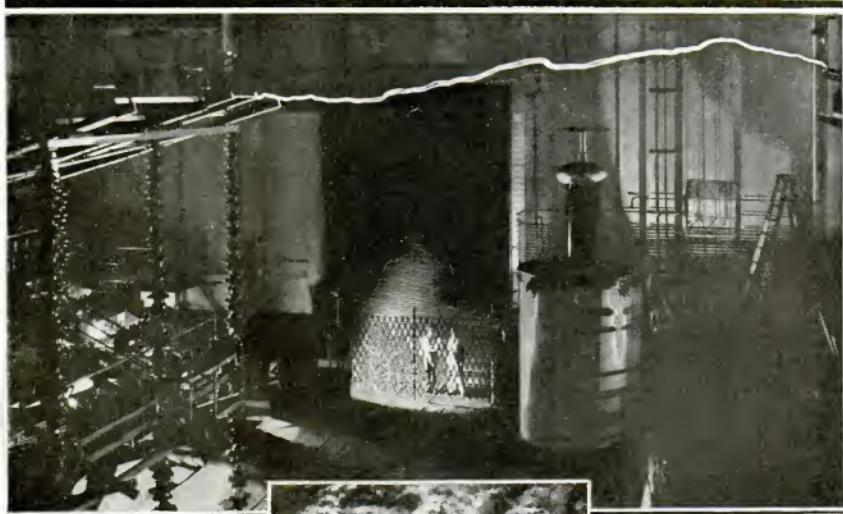
Right, Sidewalk Ripped by Lightning Traveling along an Abandoned Gas Main after Hitting Tree



Lightning Display over City of Innsbruck, Austria

with ten-million-volt artificial lightning generators in the laboratory and who go into regions where severe storms occur to study the flashes at close range—have photographed lightning consisting of as many as ten separate strokes to the ground. One of these strokes was a multiple flash of ten recurrent discharges over the same path. The photographs were obtained with a special type of camera in which the film whirls past the lens at better than a mile a minute.

Fabulous tales about lightning still circulate throughout the world. In Europe, thousands of objects popularly identified as thunderbolts or thunderstones are preserved in the homes of country folk, who regard them as charms against a number of harmful agencies. Some are really prehistoric flint axes and arrowheads; others are natural stones of unusual shapes, or fossils. Among mineral formations resulting from lightning are fulgurites, or "light-



ning tubes," which are produced in the ground by the fusing of loose sand along the path of a lightning discharge. They are of various sizes, from a fraction of an inch to several inches in diameter, and sometimes twenty-five feet or more in length. The inner surface is smooth glass, while the outer consists of rough, incompletely fused particles of sand and often bears longitudinal ridges and furrows. The tubes are frequently twisted in spirals and are sometimes branched.

A so-called fairy ring is usually a narrow circular band of bare soil bordered by luxuriant vegetation. The ring grows from year to year and may become scores of feet in diameter. The familiar legend concerning such rings is that they are made by the footprints of fairies dancing in a circle. In the sixteenth century attempts to substitute a scientific explanation for this superstitious one led



Left, White Strip Indicates Length of Fulgurite Beside It; Right, Piece of Fulgurite Showing Rough, Winged Surface

Top, Bolt of Man-Made Lightning Produced in General Electric Company's Laboratory; Discharge Is Ten Million Volts



to the equally erroneous belief that the rings are produced by lightning, and this belief was orthodox in the scientific world

(Continued to page 120A)

Giant Screw Propels Motor Sled over Snow



Motor Sled Which Is Propelled by a Giant Screw at a Speed of Twenty Miles per Hour

Equipped with a thirty-five horsepower air-cooled engine that turns a giant screw, a new motor sled is capable of fifteen to twenty miles per hour over the snow. The screw is a drum on which has been welded a spiral spring steel blade. As the engine turns this drum, the sled screws its way through the snow. The sled is capable of climbing steep inclines and of pulling a load of 5,000 pounds on crusted snow. Constructed of airplane tubing, sturdily welded, the sled weighs only 530 pounds. Three aluminum runners carry the load, the longer runner serving the purposes of steering by means of a wheel. The sled can be turned around in little more than its own length. On a test run, the 10,000-foot height of Lassen Peak in California was conquered.

2893

FIGHTING THE HONEY BUG

Motorists who park their cars under a shade tree in summer often return to find the windshield smeared with tiny drops,

as though it had been drizzling. These drops are left by the honey bug, technically known as the aphis or aphid, a tiny plant louse. Tree spraying in spring with soapy water and nicotine sulphate is an effective means of eliminating the pest. Plant dusting with nicotine or tobacco dust also is recommended.

*Mr. Carlos E. Cummings, Director,
Buffalo Museum of Science, Pennsylvania.*



Stores Fringed with Lights Illuminate Village



Market Place of a Village in the German Black Forest with Illumination Provided by Fringes of Lights Strung Along the Roofs of Shops

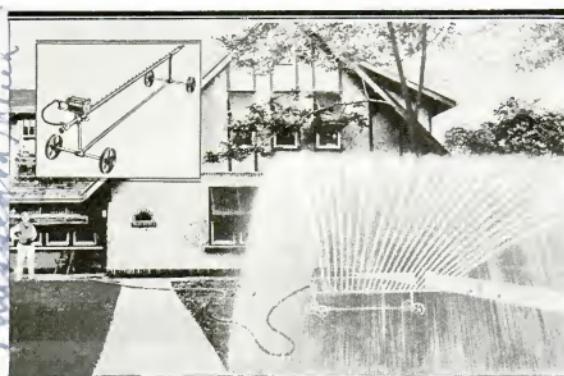
One of the villages in Germany's Black Forest has employed an unusual method for illuminating its market place. Fringes of lights are strung along the roof edges of buildings housing stores and shops and

these lights illuminate the structures while the reflected light is thrown down into the street below. Thus the decorative lights on the buildings also serve as street lights for pedestrians.

Rainmaker on Wheels Is Operated by a Water Motor

For sprinkling large lawns and gardens, an automatic rainmaker is now offered in the form of a sprinkler rotated by a water-

operated turn-motor which revolves the nozzle pipe from side to side as the sheet of water is thrown high into the air. The



**Lawn Sprinkler on Wheels Which Is Operated by a Water Turn-Motor
Which Rotates the Perforated Pipe from Side to Side**

largest size is capable of watering evenly an area forty by sixty feet, using from 400 to 750 gallons per hour depending on the pressure. The arc of throw is adjustable and it can be set for narrow strips or wide areas. Auxiliary screened tubes are available and may be inserted in the pipe for holding soluble fertilizer tablets or insecticide. It is claimed that the drops of water absorb nitrogen by being thrown into the air, giving the same effect as a natural rainfall.

Scale. Fts.
Oak Park POPULAR MECHANICS
cl Illinois

D854.

551

AUTO RADIATOR FREED OF SCALE BY TABLETS IN WATER

Pills for your automobile are now being offered by one manufacturer who is making tablets like peppermint lozenges in appearance to be added to the water in the auto radiator to prevent the formation of scale. It is claimed the tablets, when dissolved, soften the water by precipitating the mineral salts and thus keep scale from forming. Two or three tablets are used the first time to remove scale, rust and grease, and thereafter a tablet a month keeps scale from forming. *Paul J. Murphy 8/16*



LIGHT WAKES SLEEPING SEEDS AND SPEEDS GROWTH

Seeds that refuse to sprout when planted can be roused from dormancy by soaking and then exposing them to the proper colored light for a short time. Only the longer wavelengths of light have this stimulating power, Dr. L. H. Flint, of the U. S. department of agriculture, has found.



Science 6/16/34
Exposing Seeds to Different Kinds of Colored Light
in Order to Speed Up Sprouting

Seeds exposed to light at the blue-violet end of the spectrum refused to germinate. Even seeds that had been given the stimulating treatment with the longer wavelengths at the red end of the spectrum, and then were exposed to blue or green light, would not sprout. The treated seeds need not be germinated immediately. They can be dried out and planted later.

D 781
Handle with Suction Cups for Carrying Panes of Glass

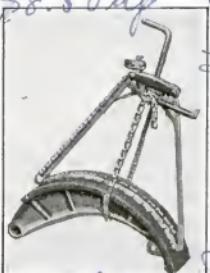
Hold Large Panes. VACUUM DISKS GRIP GLASS FOR EASY CARRYING

Large panes of glass can be handled easily with a vacuum-cup implement introduced in Germany. It consists of a handle with a rubber suction disk on each end. On the back of each disk is a small lever to prevent air from disturbing the vacuum. Pressing the disks against glass causes them to grip the pane tightly. Then the two levers are lowered and the glass can be picked up and carried by the handle.

BRAKE-SHOE STRETCHER AIDS ON RELINING JOB

D 459 38.50 up

Relining of automobile brakes is made easier by a stretcher that opens the shoe to the degree required. Adapters fit the device to various sizes, and slight pressure will readily open the brake shoe.



*Oriental Specialties
Illustrating Co.*

*68 Broadway
Los Angeles - Calif
W. H. Johnson
1333 Broadway
J. Stangenhae*

D813. Count Jacob Slezinger
A. 2240, 500, 5 miles
newspaper

CA MILLION



THE small boy swapping some knick-knack for a batch of coveted postage stamps and the President of the United States poring over a stamp collection to which he has devoted a lifetime are members of a vast brotherhood which includes 9,000,000 devotees in this country alone. American stamp collectors spend annually \$6,000,000.

President Roosevelt began collecting stamps when he was only eight. When he remarked, "I can almost say I owe my life to my hobbies—especially stamp collecting," and when, on assuming the presidency, he directed that he wanted to see "every stamp that comes into the White House," he confessed that intense attachment to his hobby typical of philatelists everywhere.

Among noted stamp collectors are King George V of England, King Emmanuel of Italy and former King of Spain, Don Alfonso XIII.

The late Count Philipp la Renotiere von Ferrary amassed a stamp collection never

equalled before or since. His collection, mounted on loose leaves in special binders, filled three walls of a large room in Paris. He spent \$10,000 a week on his hobby. The count died in 1917. When the collection was auctioned after the close of the World War, the proceeds amounted to more than \$2,000,000.

At that sale an American collector, the late Arthur Hind, Utica, N. Y., made sensational purchases including the one-cent black-on-magenta British Guiana, 1856, of which only one copy is known to exist, and for



Courtesy Stamp Magazine
Top, Stamp Club Listens to Talk by Expert; Center, One-Penny and Two-Penny "Post Office" Mauritius; Bottom, \$50,000 One-Cent Stamp

stamp catalog - Scott
Stamp & Curr Co
1 W. 47th St. New York D 813.

Dollar HOBBY Everyone Can Ride

which he paid an all-time record price for a single stamp of \$32,500. It is now worth \$50,000.

Every collector lives in the hope that some day, in old garrets, old trunks, courthouse records, the files of old business firms, and similar hiding places, he will come across a batch of old letters or papers bearing rare old postage stamps. Many fortunes are made by such chance discoveries. Take for example the most expensive stamp in the world today, the \$50,000 British Guiana one-cent, now owned by Mrs. Hind. Printed in 1856 in Georgetown, Brit-



Courtesy Stamp Magazine

*Top, Stamp Collecting Appeals to All Ages; Inset,
Top, Five-Cent Unused Millbury Worth \$7,500;
Bottom, \$6,000 Confederate Postmaster Stamp*

newyork City

ish Guiana, it was withdrawn when it was discovered that the stamp had been colored red by mistake. But a Georgetown boy, rummaging in the family attic sixteen years later, found one on an old envelope. He sold it to a dealer for about \$1.50. The dealer sold his entire collection, including the precious prize of today, for about \$600. The purchaser, realizing the exclusive nature of the stamp, offered and sold it to Ferry for \$700.

Trunks appear to be favorite places for important discoveries in rare stamp values. One woman, in going through an old trunk, found a packet of letters from which as she sorted them a few unused stamps slipped to the floor, later to be appraised by experts at \$100,000.

Because someone in 1847 made the error on Mauritius, an island situated off the



Courtesy the Newark Museum



Top, Committee Preparing for Young Collectors' Exhibit; Bottom, Examining Watermark

coast of Africa, of printing the words "Post Office" instead of "Post Paid" on some one and two-penny stamps being printed and

because these stamps were immediately withdrawn from sale, they are today excessively rare. An envelope which bears both the one and the two-penny stamps recently sold for \$25,000 and was at one time valued as high as \$50,000.

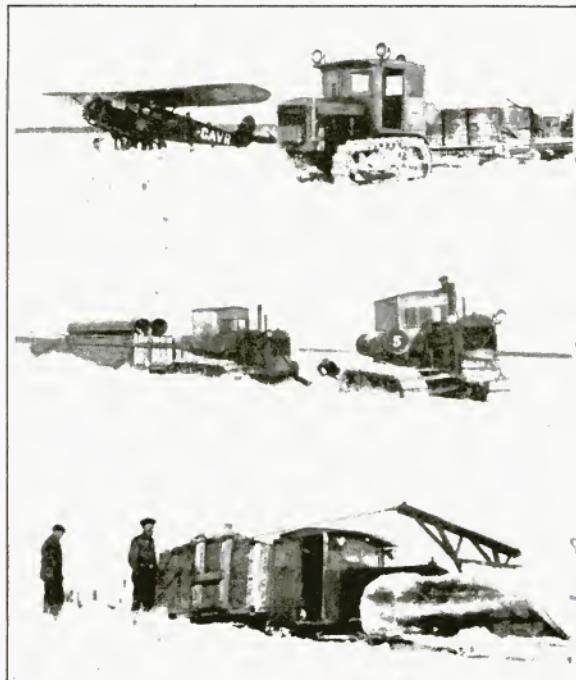
The so-called "Postmaster" stamps, issued by the postmasters of several American cities before the Federal government took over the job, never fail to bring high prices whenever they are offered for sale. One of these, a Baltimore 10-cent stamp affixed to an envelope sold for \$10,500. In more recent times, there is the 1918 24-cent air-mail stamp with the inverted airplane center.

Originally it consisted of a sheet of 100, which a young man

(Continued to page 118A)

Tractor "Trains" Move Freight in Far North

Fourteen hundred tons of mining machinery were moved 132 miles over muskeg and forest land in Canada's far north a few months ago with the aid of powerful tractors traveling as "trains." The first tractor started in a temperature fifty below zero, dragging twenty-eight tons of equipment on sleds behind it. Ten days later it reached its destination. Three months were required to move all the machinery after an airplane had surveyed a route which was cleared of trees and brush by gangs of men. Sixteen tractors were used, each carrying a crew of four men. One tractor was lost when it plunged through the ice over a lake but was recovered later. Often tractors were forced to "double up" to pull loads over slush ice and frequently the "bunting poles," logs more than ten feet long used to keep the sleighs apart, were broken. About 55,000 gallons of gasoline and 2,000 gallons of oil were used.



Using Tractors to Haul Tons of Heavy Mining Machinery in the Far North; the Tractors Dragged Sleds Which Were Operated in "Trains"

Caterpillar

snapped as the About 55,000 gallons of gasoline and 2,000

Radio Installed on Cultivator Brings Music to the Farm



Radio programs to while away the hours of plowing are brought to an Ohio farmer's ears by a battery receiver attached to a cultivator. Two lath, nailed upright to the tongue of the cultivator, are strung with wire to serve as the antenna, while the two-tube receiver is fastened to the tongue in front of the seat. The battery is under the seat. Headphones pick up the programs.

Washington County, Ohio

*Mrs. Margaret Schneidendorf
in charge.*

GARDEN LIGHT LIKE MUSHROOM ALSO SERVES AS SEAT



Combination Garden Light and Seat Made of Plaster and Cement and Shaped Like a Mushroom

Shaped like a huge mushroom, a combination garden lighting unit and seat offers the convenience of a sturdy built chair and the decorative effect of indirect illumination. It is made of plaster and cement and consists of two parts, the base and neck, and a detachable top. The base is painted grass green and the neck and top a natural mushroom color. The top contains three holes on the under side and three one-half-inch pipes protruding from the neck fit into these holes to hold the top in place. Ideal illumination calls for a 100-watt or 150-watt clear lamp, but by using an extension socket, the unit can be lighted with forty-watt clear lamps. It can also be equipped with colored Cellophane rings or screens for colored illumination.

ETHYLENE GAS HULLS WALNUTS

Hulls of green walnuts may be loosened in thirty-six to eighty-four hours by means of ethylene gas. The walnuts are placed in a fairly tight room, with the temperature close to seventy degrees Fahren-

heit. Ethylene in the ratio of one part in 1,000 cubic feet of air is introduced. Rubber balloons, inflated with ethylene to a diameter which will secure the volume desired, are placed in the treating chamber to release the gas slowly. The chamber is ventilated twice each day and recharged with the gas after each ventilation. As a rule, the hulls do not split open, but must be removed by machine or by hand.

D806

OLD CLIPPER SHIP CONVERTED INTO FLOATING MUSEUM

Seattle boasts a floating marine museum and aquarium, the old clipper ship, "St. Paul," now being used for this purpose. A notorious "hell ship" of the eighties and one of the few surviving clippers on the Pacific coast, the boat itself is the outstanding exhibit. Tanks in the hold contain living specimens of northwest marine life and there are also sailing ship models, log books, old maps and ancient nautical instruments and gear.



Old Clipper Ship, "St. Paul," Which Has Been Converted into a Floating Museum and Aquarium

*Cmt. Elmer G. Turner
4657 22nd Ave
Seattle, Wash.*

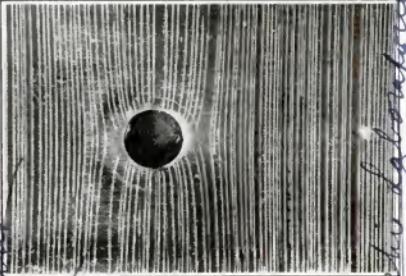
Developed by
Albert Portevin
Paris France

POPULAR MECHANICS.

557

METAL TESTED WITH VARNISH TO SHOW WEAK SPOTS

Varnish is used in a new method of testing metals and other raw materials to just below the point of permanent deformation, or the breaking point. The varnish has sufficient adhesiveness to share in any deformation, as well as being brittle enough to break or crack before the breaking point is reached. Extremely fine fissures appear in the varnished sample of metal under strain, running at right angles to the maximum tensile strain. In tests, these fissures first appeared at those points which eventually developed fissures as the metal broke down. By choosing a proper varnish, the scientist may use the process for microscopic work in determining the influence of minute flaws in metals and components, such as graphite in cast iron.



Note How Hole in This Metal Affects Its Strength
Under Strain as Revealed by Varnish Lines

PAPER OR FABRIC SENSITIZER SPEEDS PHOTO ENLARGING

Enlargement of photographs on all kinds of paper, canvas, fabric and other surfaces is made easy by a black-and-white sensitizing agent that does its work quickly. Even a wall twelve feet square can be sensitized to receive a picture that is projected on the wall while the sensitizing agent is wet. Then the photo is developed with a sponge and a bucket of developing fluid, the picture being in pure black and white. The sensitizing agent is effective on ordinary newspaper print stock without sizing. It is offered also as a means of enlarging subjects to any size for the artist, saving hours of free-hand drawing and obtaining correct perspective. One example of its use is in a newspaper published at A Century of



Some Uses of Rapid Sensitizer for Paper or Fabric;
Note Wall Printing Process

Progress, in Chicago. Wherever a photograph is to be printed, the paper is sensitized and four minutes after the picture is taken, the paper is printed, eliminating the time of making engravings. The process is recommended for small-circulation newspapers or magazines.

CYLINDER GAUGE SAVES TIME IN REFITTING PISTONS

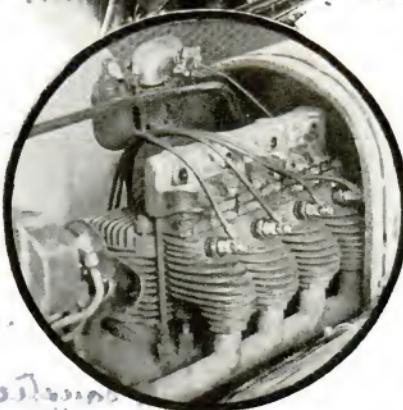
Cylinders can be measured during the process of honing without removing the hone by using a new gauge that saves considerable time for the mechanic. In addition to speeding up the work of honing all cylinders to the same size by showing exact measurements quickly, the gauge enables the mechanic to show auto owners what size pistons to use without removing the old ones.



Chicken feathers have been dissolved to form a plastic suitable for making fountain pens, insulators and various novelties.

~~DD4444~~ Cpl. Guy W. Frazier
4622 Crenshaw Blvd.

MIDGETS of the



Midget Cars in Action and Outboard Boat Motor and Motorcycle-Engine Power Plants

A NEW and fascinating sport, midget auto racing, has been elevated to a major attraction in California in the short space of ten months. The midget races are staged at Long Beach, Santa Ana, Fresno, San Jose, Sacramento and Los Angeles. The new Gilmore stadium in Los Angeles, erected at a cost of \$50,000, seats 26,000 persons and represents the last word in modern design and safety.

The races are run over an oval course measuring one-fifth of a mile in length, and are staged right in the laps of the spectators. The little speedsters spend half their time skidding around turns, but speeds of sixty miles per hour are often attained on the straightaways. This is accomplished by incorporating high-speed motors in the cars, some of them "wrapping up" to 6,000 revolutions per minute.

Skill on the part of the drivers, together with daring, is essential to success. While fast mounts are of paramount necessity, the ability of the driver to jockey for position is the chief factor in winning. Despite skidding, "bunching" on the turns and other hazards, accidents are surprisingly

ROARING ROAD

whitey Thiesen.

Pete Vaccaro



rare. Barring collisions, there has never been an instance of one of the cars capsizing and as yet there have been no fatalities among pilots.

The cars are of various sizes and shapes with the average wheelbase measuring seventy inches and the tread forty-two inches. The wide tread renders practically negligible the danger of turning turtle. The Midget Auto Racing association limits the piston displacement to 100 cubic inches but the most successful motor has only sixty inches displacement. The power plants are adapted from other vehicles, so one sees all sizes and types. The old 1915 Saxon pleasure car has contributed its motors to the midgets as has the Austin. The motorcycle motor has been converted with fair success and the Scripps-Booth four-cylinder marine motor has found its way into some of the "go-devils." The motor having most success at present is the 4-60 outboard boat motor. The average compression ratio is seven and eight-tenths to one and the gear ratio five and one-half to six to one. Small aeroplane wheels are used.



Clementine Prentiss
Barney Oldfield Looking over a Midget and a Baby Racer Equipped with Front Drive

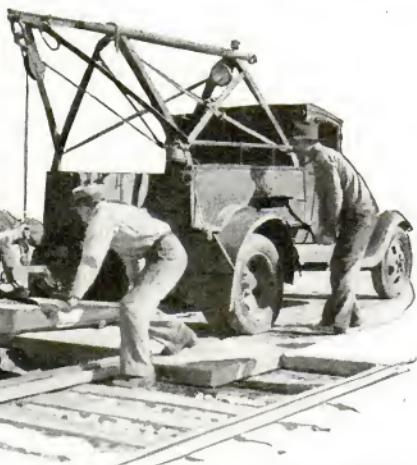
103 S. Broadway
Los Angeles, Calif.



Laying Portable Concrete Slabs over Municipal Railway Tracks; Note How the Slabs Are Moved with the Aid of Small Cranes

Portable concrete slabs are being used as fill-in pavement around eight and one-half miles of track of the Municipal railway of Seattle. With the aid of federal funds, the city has manufactured 68,050 slabs, costing about one-half as much as permanent paving because new rails and ties are not required. The slabs can be removed at any time with a small portable crane, each block having a hole and steel center for lifting, for track adjustment.

Under heavy traffic conditions, there is a small amount of breakage and some rattling, particularly on hills where there is

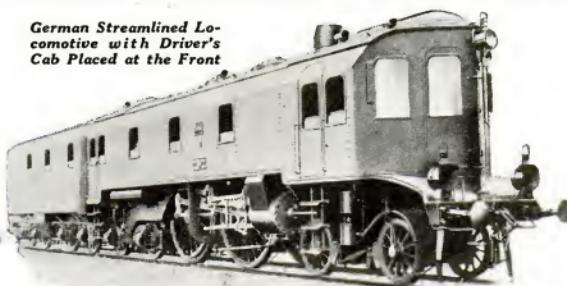


a tendency to creep, but the slabs serve the purpose of eliminating traffic hazards at points where many auto accidents have occurred. Raw materials for the slabs go in at one end of the manufacturing plant and come out, finished, to waiting trucks at the other end. Three sizes of slabs are used, one outside the rail, another for the tracks and the third for the center slab. If it is later decided to lay permanent paving, the slabs can be salvaged.

D 758

Driver's Cab Is Placed at Front of Streamlined Engine

German Streamlined Locomotive with Driver's Cab Placed at the Front



Germany, along with other countries, is experimenting with streamlined locomotives. The latest engine created in that country has a wedge-shaped front and the engineer's cab has been placed in this section so as to provide better vision for the driver. The engine is being used for fast passenger service.

*Produced at Henschel Works
 Cassel, Germany.*

Periscopes Used at Races to See over Crowd

Periscopes have been introduced at German race tracks for the use of spectators far back in the crowd. By means of the simple arrangement of mirrors, the spectator can follow his favorite horse's dash around the track, his view unobstructed by the heads of fans nearer the rail. The device consists of reflecting mirrors so placed that when the operator looks into the mirror at the lower end, he sees the image of the race reflected by a mirror at the top.



W. D. Longyear of Paul Mantz, D868
Crowd at German Race Track Using Periscopes to See over the Heads of Those in Front and Follow the Progress of the Horses

REVERSIBLE PITCH PROPELLER ACTS AS A BRAKE

Adjustable and reversible in pitch, a new propeller enables the pilot to take off or land his plane in less



W. D. Longyear of Paul Mantz, D868
Reversible Pitch Propeller Which Acts as a Brake When an Airplane Is Making a Landing

than fifty feet, ascent and descent being almost vertical. A feature of the air screw is that it can be pitched to any degree, in

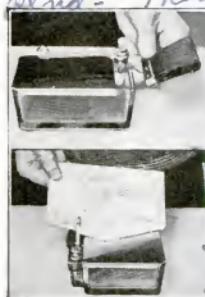
developed by group headed by W. D. Longyear,
Los Angeles.

contrast to the two degrees of pitch possible with other propellers. In making his landing, the pilot simply throws the propeller "into reverse," retarding the forward progress of the ship to make it come down in a gentle descent. Instead of pivoting, the propeller turns all the way and full speed astern becomes as easy to produce as full speed ahead. As a brake, the propeller is said to eliminate ground loops which sometimes result from application of brakes.

D444

WATER VISIBLE IN MOISTENER WITH GLASS RESERVOIR

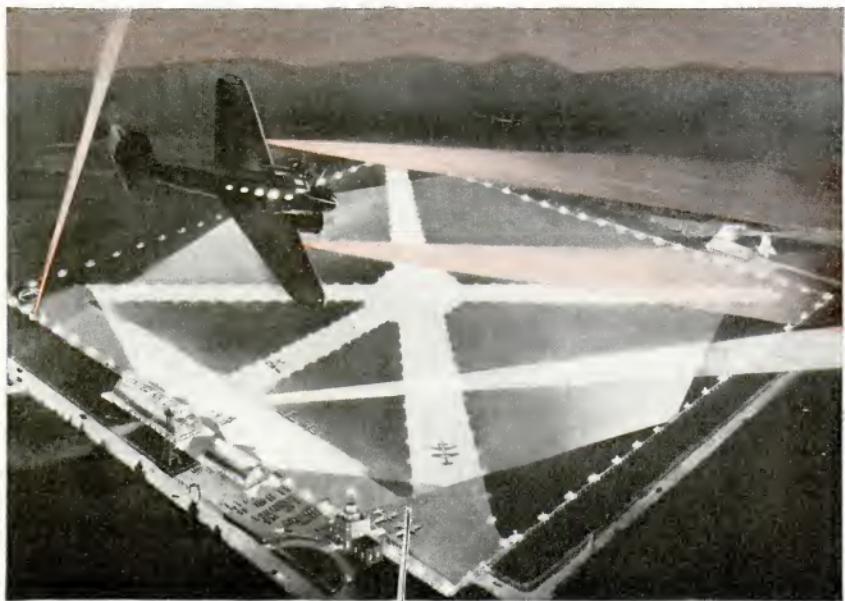
Fitted with a glass reservoir, an improved moistener for gummed surfaces or the finger tip keeps the water level visible. Metal parts are non-corrosive. Rubber feet keep the moistener in place on the desk.



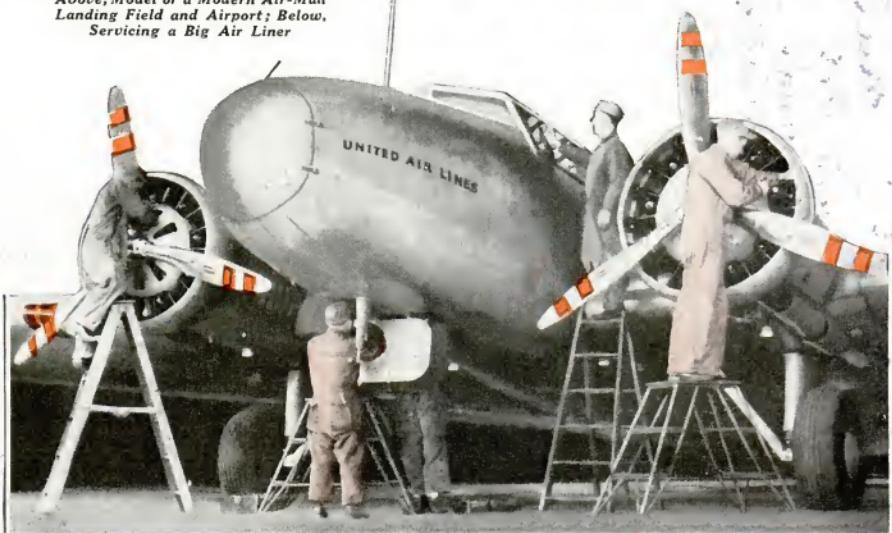
The Colgate laboratory Washington D.C.

D508 Magee

Thrills of FLYING



Above, Model of a Modern Air-Mail Landing Field and Airport; Below,
Servicing a Big Air Liner



the MAIL

Right, Pilots Waiting for Weather Reports; Below, Servicing One of the Many Airway Beacons



By H. W. MAGEE

IT was in the days soon after two-way radio-telephones were installed on mail planes. A pilot battling snow and sleet gave his position to a radio dispatcher 200 miles distant and reported ice was forming on his wings. Suddenly the tense dispatcher heard the pilot's voice again.

"I'm losing altitude fast," he said, then, after a pause, "I'm coming down—count to me—count to me."

With a vision before him of a lonely mail flyer crashing in the storm and seeking the comfort of a friendly human voice as he fell, the dispatcher started counting.

"One—two—three—four—five—," he began and continued into the twenties. Then he stopped to listen. No reply came.

There is a happy sequel to this incident. The pilot stayed with his ship and mail and landed without serious injury. Later he met the radio man who did the counting.

"The first thing I heard after landing," he said, "was your voice still droning numbers in my ears. I couldn't tell you to quit because my radio was put out of commission. The reason for the counting? I couldn't see,





and wanted to gauge the time of my descent."

Because the mail pilot is not a fair-weather flyer, ice still is one of the hazards he faces, but many planes today are fitted with "overshoes" on the wings and with the other devices intended to prevent ice from logging down a ship. In addition, experienced pilots have learned how to dodge ice by seeking a different air strata when it threatens them.

It is difficult to visualize the dangers faced by the pioneer pilots who blazed the air-mail trails because we have been accustomed for so long to drop a letter marked "via air mail" into a corner box, certain that in some way it would reach its destination quickly and safely. High adventure still flies with the mail, but modern equipment, million-mile pilots and long years of experience have robbed the service of many

of its former dangers. A big tri-motored plane thundered above a sea of shifting clouds one winter's night destined for the Pacific coast. For three hours pilot and co-pilot had navigated a compass course; for three hours they had not seen the ground. As the third hour passed they calculated they were over the broad Sacramento valley. By radio-telephone they learned a 3,000-foot ceiling prevailed over this region. So they began seeking a "hole" to come down for a landing.

At last they found the break in the clouds they sought and spiraled down through it. Beneath



Above, Instrument Panel of Early Air-Mail Plane and Modern Ship; Below, Light Recessed in Mail-Plane Wing

them was a revolving beacon and the boundary lights of an airport. They landed, confident they were near Oakland. Instead they were in Nevada, more than 100 miles from Oakland. They had been swept off their course by a cross wind. Today directive radio beacons keep mail planes on their routes, the radio signals warning the pilots as soon as they begin deviating from the wide swath of airway.

These pilots would rather talk of the amusing experiences than the dangerous ones. One of them tells rather sheepishly of a rough trip from Omaha to Chicago years ago during which he saw little of the ground and finally flew by instinct alone. He got cold and opened a jug of coffee. His numb fingers dropped the top and it fell up. He looked up, and there were the lights of Chicago—above him. He had been flying on his back.

It would be difficult for an experienced mail pilot today to fly upside down unintentionally. On the instrument panel in front of him are a score or more of instruments, each supplying flight information. Included are three recently developed aids to "blind" flying; an artificial horizon to show when the ship is on an even keel, a directional gyro to record direction of flight regardless of any abrupt maneuver of the aircraft, and a sensitive altimeter whose "minute" hand registers changes of altitude in tens as well as hundreds of feet.

When Jack Knight, now a million-mile pilot for United Air Lines, participated in the first continuous mail flight across the continent thirteen years ago, he landed at Omaha by the light of bonfires and arrived over Iowa City out of fuel to find the airport hidden by darkness. He finally landed by the flare of a railroad fusee set by a night watchman.

That couldn't very well be duplicated today either. Ground crews are always on the job, landing fields are well marked and for an emergency landing today Knight's big monoplane is equipped with two 550,000-candlepower searchlights recessed in the wings. In addition he has parachute flares to illuminate a square mile of ground as bright as day. The same route over which he made that first trip today is part of a lighted air boulevard extending from the Atlantic to the Pacific

(Continued to page 122A)

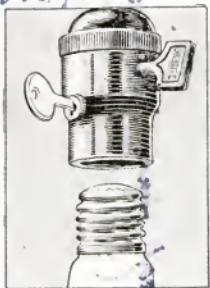
*D8L 3 Henry Paulson Co.
378 Wabash*
QUICK TIMER FOR WATCHES
SPEEDS UP REPAIRS



Instrument Which Tells in One Minute Whether a Watch Is Gaining or Losing Time and How Much

Watch repairs can be speeded up by a micrometer that determines accurately in one minute how fast or how slow a watch is running. The one-minute test reveals the gain or loss in time for a period of twenty-four hours. If the beat of the watch does not synchronize with the tuned revolutions of a numbered disk, lighted numerals on the disk show the degree of inaccuracy.

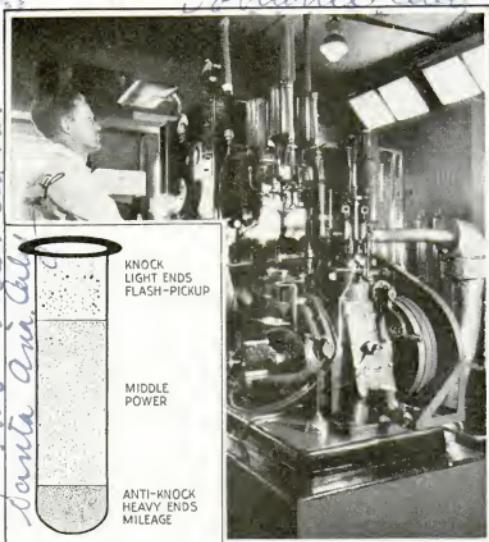
D864
SOCKET LOCKS ELECTRIC LAMP
PREVENTS THEFT



Theft of electric lamps is prevented by a socket lock that grips the bulb tightly until a key is used to permit removal. The lock is a part of the socket. When the bulb has been screwed into the socket, the key is turned, making the connection theft-proof, as well as preventing the bulb from loosening. It lengthens the life of lamps because contact is always positive.

*The Lottelite Co. 416
Maple St. Iron Mountain
Michigan*

D 818 Torrance Refinery General Petroleum Co. Knock in Gasoline Measured by Test Engine



Test Engine for Measuring Gasoline Knock and Tube Showing the Heavy, Medium and Light Parts of Gasoline

D 852
Gasoline is rated according to its anti-knock qualities by a testing engine employed by one oil company to produce the

exact balance in gasoline which is desired. Broadly speaking, gasoline is composed of three parts, heavy, medium and light. The heavy parts contain the mileage and anti-knock values, the middle parts constitute the body and provide the power while the light parts give flashy performance including quick starting and rapid acceleration. The ideal gasoline combines maximum mileage, power and flash with a minimum knock. The testing engine determines the point at which the balance between the heavy and light parts produces a knock. The gasoline is first separated in the laboratory into its various parts, or fractions. These parts are then fed into the mixing chamber of the engine. When the percentage of lighter parts reaches a certain point, the engine starts knocking. This point is given a numerical rating which is the octane or anti-knock rating of the gasoline. A gasoline with an octane rating of seventy, for instance, has a higher anti-knock value than a fuel with a rating of sixty.

D 852
gasoline with an octane rating of seventy, for instance, has a higher anti-knock value than a fuel with a rating of sixty.

Locomotive Has Six Engines but Will Run on Any Five

D 852
The Mountain Wagon Works.
Locomotive Works.
Fitted with six engines, any one of which may be disconnected in an emergency, a twelve-cylinder mountain-type steam locomotive has been built in England for use in the Andes of South America. The locomotive will operate on any five of its engines. The disabled engine can be disconnected in five minutes. Steam is produced in less than half the time ordinarily required. The boilers are constructed so that every part of each tube can be seen from the locomotive cab and can be cleaned easily. It is

claimed that this type of engine saves fifty per cent in fuel costs.



Mountain-Type Steam Locomotive for Use in Andes; It Has Twelve Cylinders and Six Engines but Can Operate on Five

Cpl. Wellens

**TRAIN OPERATES TUNNEL DOOR
WHEN IT APPROACHES**

Railway tunnels on a scenic route in the Swiss Alps are equipped with doors at each end to prevent the formation of ice on the walls and the seeping of snow through the entrances. The doors are opened automatically as an electric train approaches the entrance or exit and are also closed after the train has passed. The doors also contain two slots which open automatically to release the currents of air set up by the passage of the train through the tunnel. Colored lights indicate whether a tunnel door is open or closed. The approaching train makes contacts which start a two-horsepower motor, this in turn opening the door. As the train passes similar contacts cause the motor to reverse its action and close the door.



*Doors at Entrance to a Railway Tunnel in Swiss Alps
Which Open Automatically as Train Approaches*

**FIRE PROVES FRIEND OF TREES
IN DESTROYING INSECTS**

Fire, normally the greatest enemy of timber growths, has been converted into a friend of trees in United States forestry work in Utah. Man-made pillars of flame



Setting Fire to a Tree Which Has Been Sprayed with Oil to Eradicate Insect Pests

envelop trees in valuable stands of timber as a part of the forest-service insect eradication work. Forestry workers carry tanks of oil and the tree is first sprayed with the oil, then the infested area is set afire. Each spraying crew is followed by men with shovels to prevent the spread of the blaze.

**PROTECTOR FOR GASOLINE TANK
PREVENTS THEFT OF FUEL**

Gasoline cannot be stolen from an automobile tank equipped with a protector which is installed permanently in the neck of the tank. The protector does not interfere with filling the tank, but a series of traps prevents siphoning.

The protector can be installed in a few minutes.



*Ringless Protector
Oshkosh, Wis.*



Steam Rising from Water as Big Boat Was Being "Boiled" to Release Congealed Oil

STEAMER IS "BOILED" IN WATER TO FREE CONGEALED OIL

In a huge "kettle" 400 feet long and sixty feet wide, the 9,000-ton steamer, "Royal Star," recently was "boiled" in water like a big fish at a dock in England. The purpose was to release a large quantity of congealed oil which had accumulated in the false bottom of the boat. The dock was partly flooded with water and the water was brought to the boiling point with the aid of steam pipes extending into it, thus freeing the oil.

D799 HANDY CARRIER FOR MOTOR OIL CLAMPS UNDER HOOD OF CAR



Taking extra motor oil on a long car trip is made a simple matter with the aid of a carrier which supports two quarts of oil and attaches to the braces which support the hood. Clamps prevent the carrier

from rattling or shaking loose and the danger of soiling upholstery or clothing is eliminated since the extra oil is under the hood instead of in the car with the passengers. Little time is required to transfer oil from the carrier to the crankcase.

D825

AERIAL SWING LOOPS THE LOOP FORTY FEET ABOVE GROUND

Those who have wondered about the sensation of looping the loop in an airplane can now find out for themselves, without going more than forty feet off the ground, by climbing into a swinging gondola, California's latest ride thriller. The swinging gondola consists of a metal compartment, seating six persons, mounted between twenty-foot steel girders. It is attached to a cross bar on top of the girders in such a manner that it is free to revolve in a vertical plane. The passengers are strapped in with airplane safety belts and the gondola travels at a speed of fifty-



Passengers in Inverted Position as Aerial Swing Loops the Loop Forty Feet above Ground

five miles per hour, being forty feet above the ground and with the passengers upside down at the top of each swing.

*Mr. Peter Jardchi, Central Park Ave., Chicago
3428 N. Central Park Ave., Chicago*

Mr. John Branson, Venice, Calif.

D784 : Sam Brown, 151
Carhart, Marion
Ohio

MAGIC for Everybody

THERE were three queens. They were very chummy. Wherever you'd find one, you'd always find the others.

Do it like this. Locate the four queens in a deck of cards. Arrange them, with three indifferent cards, in the manner shown in Fig. 3. Conceal the odd queen behind one of the cards and exhibit the fan of cards to the audience. They will see three queens and three off cards. Now, place the cards face down on the deck. Deal off the cards in two piles, a card at a time to each pile. When you come to the sixth card, slip it under the two cards in the right-hand pile, as shown in Fig. 2, and return these three cards to the deck. Show the other pile. They are the three queens. Place the ladies on top of the deck and deal again, following the same procedure as before. You'll always find three ladies in the left-hand pile.

Here's a simple little stunt that

-And Here
are the
Three
Ladies



D984



will keep them guessing for awhile. Show three packs of paper matches. Announce that your sense of touch is so delicate you can detect the removal of a match from any particular pack. Allow a spectator to remove a match from any clip to prove it.

It's very simple. You open each pack, and give the flap a bending twist, as shown in Fig. 4. When the pack is closed, this will result in a slight projection, as shown in the lower part of the sketch. If you insert the flap tightly, however, you can make it line up perfectly, or better, project a little on the opposite side. You can easily tell which pack the spectator opens by simply glancing at the telltale projection.

Can you do this one? Here are two glasses—one full and one empty—arranged as shown in Fig. 7. Can you drink the contents of the lower glass without touching the upper glass with your hands, or removing it from its place on top of the full glass? The stunt is done in the manner shown in Fig. 6. This fulfills all of the conditions.

Threading a needle is no trick at all.

Take a length of string and wrap it three or four times around your left thumb, as shown in Fig. 8. The end marked "A" is the end you start with; the end marked "B" is the end that is wound around. Make the eye of the needle as shown in Fig. 9. Notice that end "B" of the string makes the inside of the loop "C." Now, take the end, "A," and make a few stabs at the loop. Threading the needle is done in a jiffy by simply giving a little side jerk on "A" as you make the stab at the loop. Looking at the exposed view, Fig. 10, you can see that the end, "A," simply slides up the end "B" to find its way into the loop.

It's rare fun when done quickly.

Here's a good chemical stunt and you can get all the stuff for a few dimes at the drug store. You need a jug or a bottle of at least one pint capacity, also four glasses. Fill the bottle with water, and add to it about as much sodium salicylate as you can heap on a quarter. Also, add about ten drops of

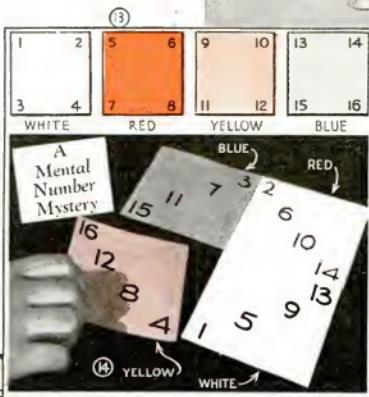


sodium hydroxide. Glass No. 1 contains two drops of ferric chloride; glass No. 2 contains about three drops of phenolphthalein; glass No. 3 has about ten drops of copper sulphate; glass No. 4 contains about twelve drops of strong oxalic-acid solution. Pour the contents of the bottle into the glasses and you will get sherry in the first glass, red wine in the second, green Chartreuse in the third, and water in the fourth. The fourth glass, of course, is the one on the Scotchman. When he

suggests that the four glasses be mixed together to give his some flavor, the contents of the whole bottle turn back to water again!

You have four little numbered cards, as shown in Fig. 13. On the reverse side of each card is another set of numbers, as shown in Fig. 14. All of the cards are different colors, the white card being known as No. 1; the red as No. 2; the yellow, No. 3, and the blue, No. 4. Now, exhibiting the cards as shown in Fig. 13, you request a spectator to pick up a card and mentally choose any number on the face of the card. The cards are then turned over so the numbers will form a circle, as shown in Fig. 14. The performer asks the spectator on which color he sees his number. The performer immediately calls out the selected number.

This is simple. Notice that when the cards are turned over to form a circle, the lowest number on each card makes up the four original numbers on card No. 1—the white card. In a similar manner, the second-lowest num-



ber on each card makes up the four original numbers on card No. 2—the red card. Knowing which card the spectator picked up originally, you can easily tell him his number when he announces what color his number is in the circle.

Take a loop of string. Wrap it four or five times around a pencil, as shown in



Fig. 15. Now, bring your thumb down between the two strings of the loop, as shown by the arrow in Fig. 15, and by the position thus taken, Fig. 16, grasping the end of the pencil lightly between thumb and forefinger. From this position, if you lift your finger from the end of the pencil, the loop will come free; if you lift your thumb, the loop will not come free. It's another of those things proving: "It doesn't pay to gamble with strange people."

D 784
Flies get the blues when they encounter blue colors, according to the findings of a British metal-box company. The company produces tins for kitchen supplies and discovered that flies appeared to shun all the boxes painted blue although no one could find the reason for their dislike.

Cub Montague

D846.1.27.1

Dausch & Lomb Optic
Rochester, N.Y.



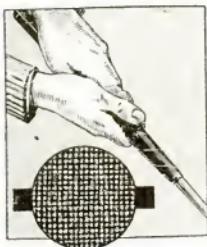
Combination Camera and Microscope Which Makes It Easy for Amateur to Make Microphotographs

CAMERA-MICROSCOPE OUTFIT READY FOR THE AMATEUR

Designed to give the amateur good results at moderate cost, a new camera and microscope outfit is on the market. The microscope is bakelite and chromium, equipped with the curved arm typical of instruments used in the laboratory. It may be used as a micro-projector and for photomicrography. Two objectives accompany the instrument, giving magnifications of seventy-five to 300 diameters. The camera is mounted so that it may be swung into position for taking the picture after the slide has been prepared. A booklet supplied with the outfit tells how to prepare slides of interesting subjects.

D830

NON-SLIP GOLF CLUB TAPE GIVES POSITIVE GRIP



Special tape for wrapping the shaft of a golf club gives a positive grip when the hands are moist and thus allows the golfer to relax his hold when making a shot. Ridges and depressions in the tape mesh with

those of the hands so that when dry, friction keeps the club from slipping and when

wet, suction and vacuum give a secure hold. The tape is applied without glue by first wrapping the shaft with ordinary friction tape.

D829 INDUCTION OVEN COOL TO MAN BAKES PAINT ON METAL

Cool to the human body but hot to metal, an induction oven is being used in Plymouth Motor corporation plant to bake the paint on metal parts, such as radiator shells and wheels. The oven is a method of heating iron or steel by causing the metal to be carried through a magnetic field. Electricity is generated at 360 cycles, 440 volts, three phase and transmitted through a series of wire coils wound around the interior walls of the oven. Baking requires fifty-five minutes, compared to three hours for the old type steam-heated ovens. The induction oven produces a temperature of 230 degrees in metal, but a person sitting beside the iron or steel bar will not feel uncomfortable.



Induction Oven for Baking Paint on Metal; It Heats the Metal but Is Cool to the Human Body

Names and addresses of manufacturers and dealers in articles described in this magazine will be furnished by our Bureau of Information upon receipt of a stamped, self-addressed envelope.

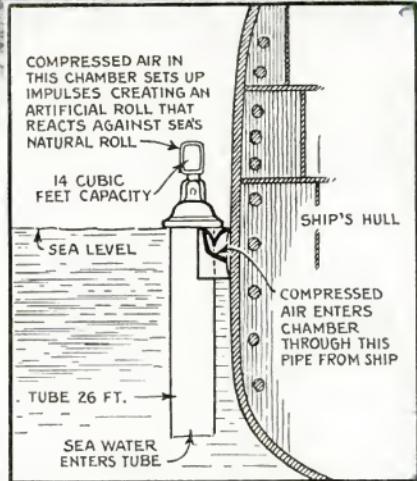
*plexer-lspc. Co.
138 Marietta St. Atlanta, Ga.*

Compressed-Air Stabilizer Stops Roll of Ship



Ocean Liner Equipped with Compressed-Air Stabilizers; Shown at Right, to Prevent Rolling

By using a compressed-air stabilizer on each side of the hull, a Dutch liner eliminates the rolling of the vessel in a heavy sea by creating a counter roll to balance the ship. Steam or compressed air develops the counter impulses which are imparted to the water about the boat. The stabilizers consist of vertical tubes, one attached to each side of the liner, and open to the sea at their lower ends. The water level in the tubes is the same as in the sea outside but as the ship rolls, so that the water tends to rise in one tube, the compressed air comes into action and the force it exerts on the water tends to right the vessel. In permanent installations the tubes can be built into the hull instead of projecting from it amidships. In each tube a chamber of fourteen cubic feet capacity is fixed at the top, and an auxiliary air compressor supplies a pressure of 140 pounds per square inch, the air reaching the stabilizers through a pipe extending inside the hull. In permanent installations automatic valves would supply the compressed-air impulses to the tubes each time the vessel attempted to roll. It is



claimed the system is inexpensive to install and to operate.

SILVER USED AS DISINFECTANT

One part of pure silver in a quarter billion parts of water may replace chlorine and oxygen as a disinfectant for swimming pools, artificial ice and drinking water. A process for activating water with silver originated in Germany. The activation is accomplished by a small tank-like apparatus installed in the supply pipe.

N.V. Rotterdamse Lloyd Steamship Line

Katadyn process
Katadyn line
Katadyn ad mattoh

Mechanics of TEACHING



By FRED C. KELLY

A FRIEND gave me a large fishing reel, the kind used in catching tarpon, a while ago, but as I never fish for anything larger than brook trout, I used the reel to teach a dog to stop in his tracks on command.

A dog learns by association of ideas. If he discovers his master's whistle invariably means food, he is glad to come when he hears the whistle and forms this habit until he comes just as readily even though, later, he gets no food. He can be greatly encouraged to associate the whistle with the idea of running toward his master, by putting on him a collar having dull spikes on the inside, a training collar. The master yanks him by a long cord simultaneously with the sound of the whistle. Thus the dog can't well help associating the whistle with running toward his master, for if he fails

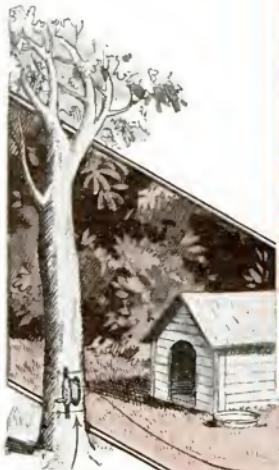
Racing Greyhounds and Teaching Dog to Jump through Arms, Refrain from Fighting and Back Somersault

Col. Fred C. Kelly
"Hickory Hills"
Peninsula, Ohio

D 833

Your DOG

Right, a Winner of Twenty-Three Championships; Below, Using a Fishing Reel to Teach a Dog to Stop When Ordered



FISHING REEL



to do so promptly he finds himself compelled to come.

It was this kind of association I had in mind when I hit on a use for the tarpon reel. First, I attached the reel to the handle of a fishing rod and tied the rod to a tree. Then I wound on the reel a stout cord 100 feet long. I marked a spot where this cord would reach when completely unwound. I fastened the end of the cord to the dog's training collar, with the dull spikes inside, and we were ready to proceed with a lesson. Starting from the tree, I ran and called the dog to follow me. He gladly did so. As we approached the spot where I knew he would have to stop, at the end of his rope, I shouted "stop!" But he either did not think I was serious, or else was too intent on plans of his own, for he did

not slow down until he had to. We tried this over and over and it was surprising how slow he was to realize that it would be more comfortable and better to halt when I gave the signal. Gradually, however, he got the spirit of the thing and did actually stop just a little before the cord



became taut. After a day or two of practice I had him in a frame of mind ready to follow orders instantly, even without any cord or collar. For years afterward I could make him stop instantly, even if he were rods ahead of me, just by shouting a command. Indeed, I once saved his life when he was chasing another dog. I saw that he would run in front of a rapidly approaching automobile. It is not easy to divert a dog's attention from another dog just ahead, but my shout of his name and "stop" got into his consciousness and he halted. He had never ceased, somehow, to think that when I said to stop, he must do so or else feel those jabs on his neck.

For years I wondered how performing dogs in circuses and traveling shows were trained to turn back somersaults. Even if

D813

the dog knew what one desired him to do, the skill required would make the feat difficult enough. I used to feel ashamed of myself when trying to teach the trick to dogs when I reflected that I couldn't do it myself—even though I knew what I was supposed to do, and the dog did not. After years of curiosity about this trick, the last time I saw it done in a circus I hunted up the dog trainer after the show and asked him for an explanation.

Like most mysteries, it was simple enough when understood. The man showed me a little harness consisting of a girdle around the dog's body, on each side of which were

two straps attached by swivels to permit the dog to turn over and over without twisting the straps. The trainer described how he would start the dog up a little inclined plane, holding these straps and turning the dog over in mid-air, after which he would reward him with a piece of meat. Of course, he carried out this training when the dog was hungry and consequently anxious to go to any length to obtain food. He made the dog wish to do the trick. The dog soon started to help



Photo by Fall

Top, a Thoroughbred; Below, Teaching Dog to Come at a Whistle, to Stop and to Beg

himself and would spring with his hind legs at the proper time to throw himself over backward. Gradually the straps could be dispensed with.

D833

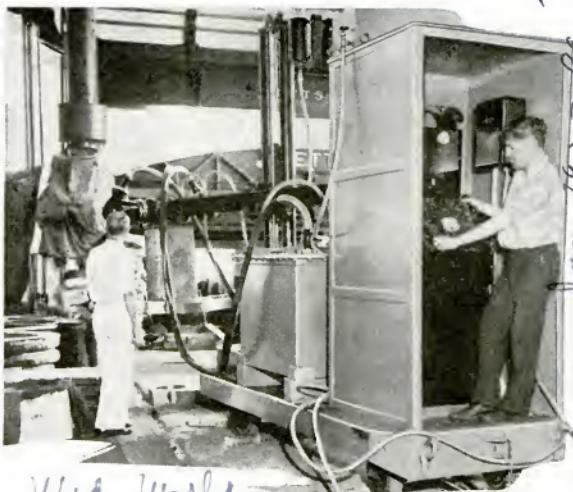
D877

POPULAR MECHANICS

577

To make a dog jump through your hands may seem fairly difficult and yet I believe I can teach this trick to almost any dog in about ten minutes —by building associations, and in easy stages. First I make sure the dog is hungry; then I hold a cane in my hands only an inch or two above the floor, and make him walk over it toward food, temptingly displayed. Gradually I raise the cane a few inches. After I have increased its height, I drape a newspaper or cloth over it to make it more natural for the dog to go over it rather than under it. If he does not go over it, I refuse to give him the food. In a short time he recognizes that he must go over the cane to obtain the coveted chunk of meat. The next stage of training for this simple trick may be to hold the cane with my hands on it only a few inches apart; the final stage is to dispense with the cane entirely and clasp my hands together. The whole process, as I say, may be gone through in a few minutes.

John B. Watson, eminent psychologist, told me of an experiment in which he had two fighting pit bull terriers in an enclosure, the entire floor of which was covered by wire netting which could be electrically charged. Not enough current was used to hurt the dogs but only to startle them. Whenever they walked toward each other growling and intending to fight, an observer turned on the current. So long as they behaved politely toward each other and did not growl, they received no electric shock. Soon they learned to accept the evidence that it was unwise to fight. Thus observers had the amusing experience of seeing two able-bodied dogs eager to bite each other and walking about showing distrust of each other, but nevertheless disinclined to show any overt act of fighting, lest the mysterious sensation come upon them through their feet. They didn't understand it, but quickly discovered how to adjust their behavior.



Wed. World
Using Portable X-Ray Equipment to Detect Any Hidden Defects in the Interior of Heavy Steel Castings

POWERFUL X-RAY ON WHEELS TESTS HEAVY STEEL

Hidden cracks in the interior of heavy steel castings are detected by a powerful X-ray machine mounted on wheels. The equipment takes pictures through four inches of steel. Gun carriages, armor plate and other forms of steel construction of the United States navy are subjected to the penetrating rays of the machine, which operates at 220,000 volts.

D814 Washington C

NAIL FILE FOR CANARY BIRDS KEEPES THEM SINGING

Toenails of canary birds must be clipped regularly if the birds are to do their best singing but clipping by hand often injures the feet.

An automatic nail file for the birds is now being offered which wears off the nails as the birds hop around in the cage. It consists of a stick coated with carborundum. The stick is placed in the cage as a perch and the birds do the rest as they hop about on it.



canary products Co
canary and

see Jan. 1935-#C
Industrial X-Ray Co
1-16 Wednesdays X-Ray and
X-Ray

NEW CONVENIENCES



Left, Slip-On Cover for Ironing Board Eliminates Lacing, Tacking and Tying; Elastic in Hem Stretches Cover Smooth and Tight; Right, Ice Cream Freezer Is Equipped with Plug-In Electric Motor

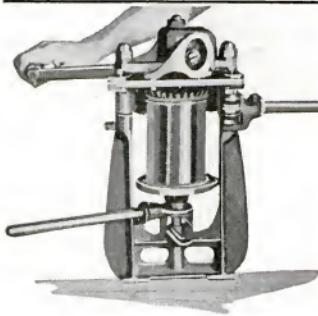


Center, Household Cutlery Rack for Attachment to the Wall Holds Eight Knives of Various Sizes; in Addition to Special Pegs for the Kitchen Shears, It Has Dish-Type Knife Sharpener; Right, One-Legged Table Makes Convenient Writing Desk or Reading Table; It Uses Both Arms of the Easy Chair as Supports for the Other Side; the One Leg Is Adjustable to Any Height Desired by the User



Above, Paring Knife with Finger Rest Protects the User's Fingers from Soreness; It Is Washed Easily

FOR YOUR HOME



Above, Can-Sealing Machine for the Home Is Operated with One Hand; It Takes Cans of Three Sizes; Can Opener with Refanging Device Makes Possible Repeated Use of Cans



Top, Double-Deck Bed Designed for Small Apartment; When Used as Illustrated, Stairs Are Required to Reach the Upper Bed; Left, Modernistic Oil Heater with Humidifying Feature May Be Taken from Room to Room; It Warms and Helps Keep Air at Proper Humidity



Left, Self-Wringing Mop Fits Any Mop Stick; It Is Lightweight and Easy to Use; Right, Upholstered High Chair Has Added Feature of Being Convertible into Play Yard for the Youngster; Turn of Knob Makes Change Quickly; Chair Is Recommended for the Small Home



D 856 Mess.
Bergfult + Hayden
Leipzig. Stoettens
Germany.

Ent. Montagnes



Portable Stitcher for Closing Bags or Cartons; It Converts Wire into Clips as a Reel Unwinds

PORTABLE STITCHER FOR BAGS AND CARTONS SAVES TIME

Time is saved by a portable stitching machine for closing bags and cartons. Developed in Germany, the device converts wire into clips as a reel unwinds. While one length of wire is fed into the machine by closing and opening a set of handles, one clip is pressed into place and its ends bent to penetrate the paper or cardboard a second time. This process produces a durable binding. The machine weighs less than twenty pounds. It is also adaptable to power operation.

BOLT CONNECTS TWO WIRES WITHOUT SOLDERING



Solderless connectors for current-carrying wires and cables have been developed to speed up the lineman's and electrician's work. The connector consists of a slotted bolt with lock washer, a combination which grips

the two wires to assure positive contact. The conductivity of such a connection, compared to an unspliced wire, is slightly above ninety-eight per cent.

James R. Kearny Corp.
4224 Gayton Ave.
St. Louis, Mo.

PLACER MINE IS THAWED OUT BY DIVERTING RIVER

D 872

Changing the course of a river for gold-mining purposes is not unusual, but a new reason for this procedure was found in the Yukon territory of Canada where part of the flow of the Klondike river is being diverted from its course in order to take the frost out of gold-bearing gravel. Mining operations were hampered by the frozen ground and regular thawing methods were too costly, but the frost is being abstracted inexpensively by diverting a part of the river over the ground.

D 874

PONTOON BOAT WITHOUT HULL OFFERS MORE SAFETY

Claimed to be unsinkable, a new passenger boat has no hull, being built on three airplane pontoons. Each pontoon is divided into five separate water-tight compartments. The center pontoon carries an eighty-horsepower engine that propels the craft by means of a straight drive. Loaded to capacity, fifty adults or seventy-five to 100 children, the boat at-



Passenger Boat Built on Airplane Pontoons and an Automobile Carrier of Similar Construction

tains a speed of ten miles per hour with a fuel consumption of four miles to the gallon. The designer sought to offer as much passenger space as possible without building too much weight into the boat, which weighs three tons.

Built by J. N. Krawchuk and

C. Dow,

Manitoba, Canada

D 4596

Ticherjar Laboratories
1429 Lafayette Blvd
Elberon, N.J.

11/24/56



AUTO SET above Windshield

LOCATED at a sufficient distance from the motor to avoid interference, no spark-plug suppressors are required with this auto receiver which is shaped to fit in the top of the car. The hinged brackets at the forward end are adjustable for various contours of header panels and the bow supporting bracket is also adjustable.

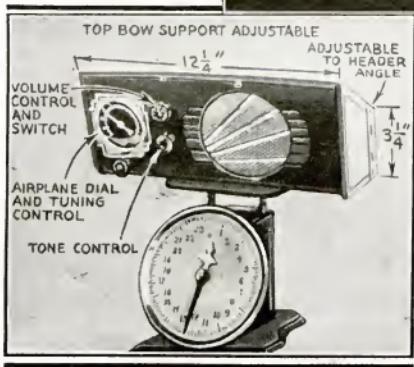
Maximum performance is claimed because of the receiver's close proximity to a standard roof antenna and the elimination of losses in the usual shielded antenna



lead. A small speaker is built into the cabinet, which is easily installed, as shown in the photos. Two hinges on the windshield header may be seen in the center photo as the

unit is swung down for service and inspection. A pair of threaded studs in one of the wooden roof bows hold the set in position for operation and there are only three wires to be connected.

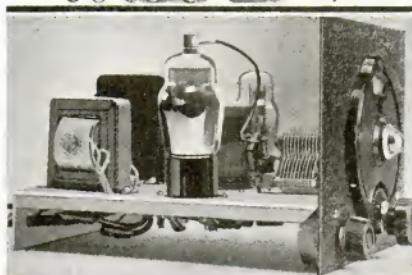
This set is a self-contained 5-tube variety with B-battery eliminator, dynamic speaker, tuning, volume and tone controls. A total weight of only $12\frac{1}{2}$ pounds is indicated in the lower photo which also shows the location of the various controls. The dynamic speaker is a compact type designed for good volume and tone. A proposed 7-tube set of this type will require a chassis only $13\frac{3}{4}$ in. long.



BEGINNERS' *for*

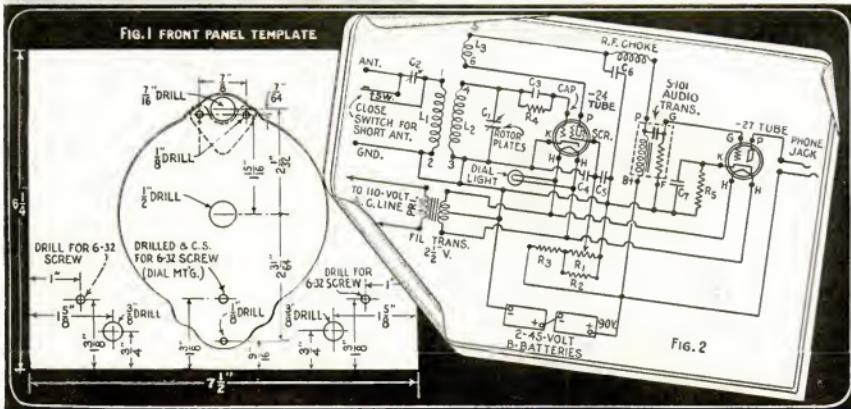


By
PERRY S. GRAFFAM



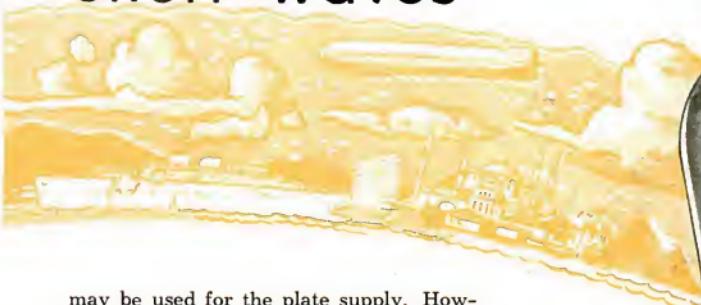
HERE is an opportunity for the beginner to construct a really efficient two-tube short-wave receiver, with no coils to wind. In a good location, round-the-world reception on head phones is possible with this simple little set. No freak circuit is employed; it consists of a regular regenerative detector and one impedance-coupled audio stage. The tubes are operated with a $2\frac{1}{2}$ -volt filament-lighting transformer plugged into the 110-volt house-lighting circuit. Two small 45-volt B-batteries, or an inexpensive B-eliminator.

FIG. 1 FRONT PANEL TEMPLATE



TWO-TUBER

Short Waves

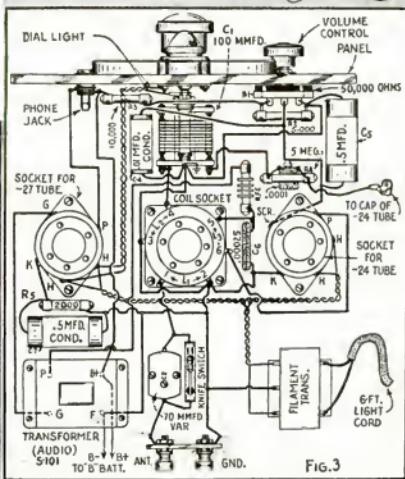
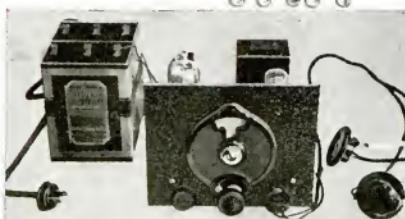


Simplified Wiring Diagram Fig. 3 Shows "X-Ray" View of All Connections Looking Down on the Base

may be used for the plate supply. However, B-batteries will last for many months and the cost of operation is quite low.

The builder will need a medium-size screwdriver, wire-cutting pliers, small fly-cutter, a hand drill and an electric soldering iron. If the drill and fly-cutter are not available, your local garage man or tinsmith will be willing to drill a few holes in the panel and base for you. Figs. 1 and 4 show the front panel and base layouts; $\frac{1}{16}$ in. eraydo or aluminum is recommended and may be bent to shape between blocks of wood clamped in a vise. They are also available formed and drilled for those who do not wish to make them. If the two side bends prove difficult they may be omitted as they are only for the purpose of reinforcing the base. If these bends are not made, two $\frac{1}{4}$ -in. metal bushings

(Continued to page 114A)



GENERAL-PURPOSE AMPLIFIER

Uses Receiving Tubes



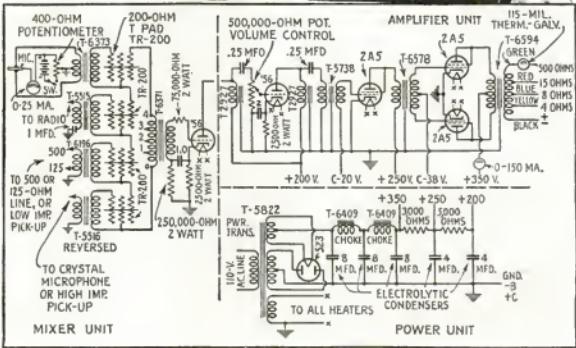
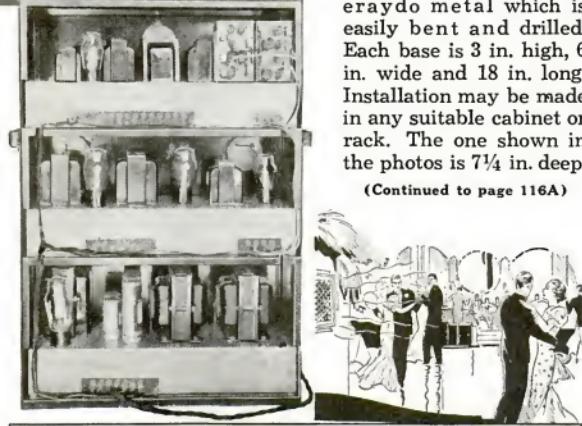
ALTHOUGH inexpensive tubes are employed in this general-purpose amplifier the output is 18 watts with exceptionally good quality. It has been designed for the greatest possible flexibility with volume amply sufficient for auditoriums and most outdoor uses. Two Wright-De Coster 305 speakers, or from 6 to 8 smaller dynamic speakers, may be operated with maximum efficiency. The cost has been kept as low as possible consistent with good practical parts and the actual construction is quite simple.

Divided into three sections, the top section consists of a 4-position mixer circuit by means of which a microphone, a radio receiver, a low-impedance line, as well as a high-impedance phonograph pick-up may be used either separately or all simultaneously. Provi-

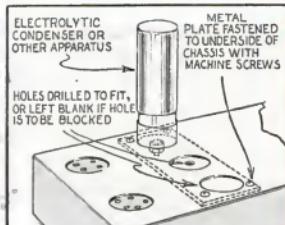
sion has also been made for the use of a crystal pick-up or crystal microphone. If this mixer circuit is not required for your application it may be omitted and any type of pick-up device desired may be connected to the grid of the type-56 tube, in the amplifier unit, by means of a suitable transformer. The center unit is the amplifier proper and the lower section consists of the power supply for the entire device. A complete material list, of all parts used in the original model, is available upon application without charge. All

bases are formed from eraydo metal which is easily bent and drilled. Each base is 3 in. high, 6 in. wide and 18 in. long. Installation may be made in any suitable cabinet or rack. The one shown in the photos is 7 1/4 in. deep,

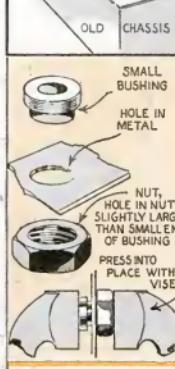
(Continued to page 116A)



Easy Solutions for Common Radio Problems



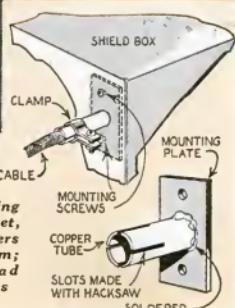
D 4584
Left, Converting Old Radio Bases to New Uses by Means of Metal Plates for Blocking Out Large Holes; Below, Interference from Neon Signs Greatly Reduced by Fastening All Sharp Letter Points Together with Fine Copper Wire Connected to Ground; Right, Inexpensive Flat-Type Wire-Wound Voltage Divider



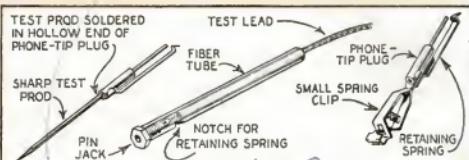
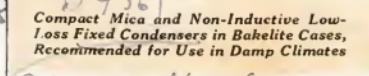
Panel Bushings Pressed into Position with Ordinary Vise; Hole Is Drilled for Force Fit; Below, Simple Remedy for Slipping Knobs



D 4585
Below, Homemade Connector Bushing for Shielded Auto-Set Battery Cable



Above, Separable Form-Fitting Tube Shields for Midget, Portable and Auto Receivers Where Space Is at a Premium; Below, Handy Test-Lead Adapters from Scrap Parts



D 4582
Airway Radio Corp., 70 Washington St., Brooklyn, N.Y.

The Grid Iron, 64-354
Dear St., Brooklyn, N.Y.

D4562 Alfred
Radio Corp.

586

83 W. Newgate St.
Chesterfield, Mass.

National Co. Inc
D4570 Sherman
Malden
Mass

POPULAR MECHANICS



All-Wave Receiver with Band Selector and Vari-Colored Pilot Lights Indicated

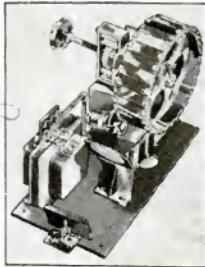
Eight-Tube Receiver Covers Five Bands

This table-model superheterodyne receiver tunes from 13 to 2,500 meters covering the ultra-short, short, broadcast and ultra-long wavelengths on five bands. Selected by means of a multiple switch, each range is indicated by a different colored light behind the tuning dial. Automatic volume control insures uniform power when tuning the various bands.

D4582

Mirror-Drum Televisor in Kit Form

Assembled from a kit of parts, this English television scanner employs a 30-mirrored drum. In operation, with the usual television receiver, a light source is modulated by the incoming television signals, passed to a Kerr cell, and the resultant varying light-beam goes through an optical system to the revolving drum from which it is reflected to a screen to build up a black-and-white image.



20th Sagittarius

Cathode-Ray Oscilloscope for Amateurs

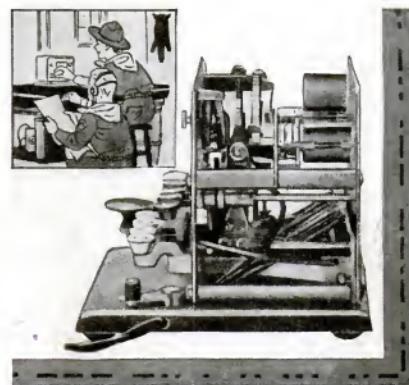
Most experimenters, service men and amateurs, particularly those interested in phone transmission, recognize the cathode-ray oscilloscope as an extremely useful piece of apparatus. Until recently, however, this equipment has been complicated and the tube rather expensive. The compact unit illustrated is now available and employs the RCA type-906 cathode-ray tube which costs no more than an ordinary medium-power transmitting tube.

D4575



Code Sender Is Semi-Automatic

The complete alphabet and numerals of the continental code may be transmitted by this keying device with only 51 motions instead of the usual 132. It is claimed to aid the inexperienced amateur in both sending and receiving. Four black keys, when depressed, send 1, 2, 3, 4 and 5 dashes respectively; four white keys send the same groups of dots in a similar manner.



Keying Unit with Cover Removed; Insert Shows Method of Operation

Blueprints covering radio construction articles in past issues can be obtained for 25 cents each; when material lists are not included in the articles, these are available without charge on receipt of postage.

X 430

AMATEUR MECHANICS



Vikings SHIP MODEL

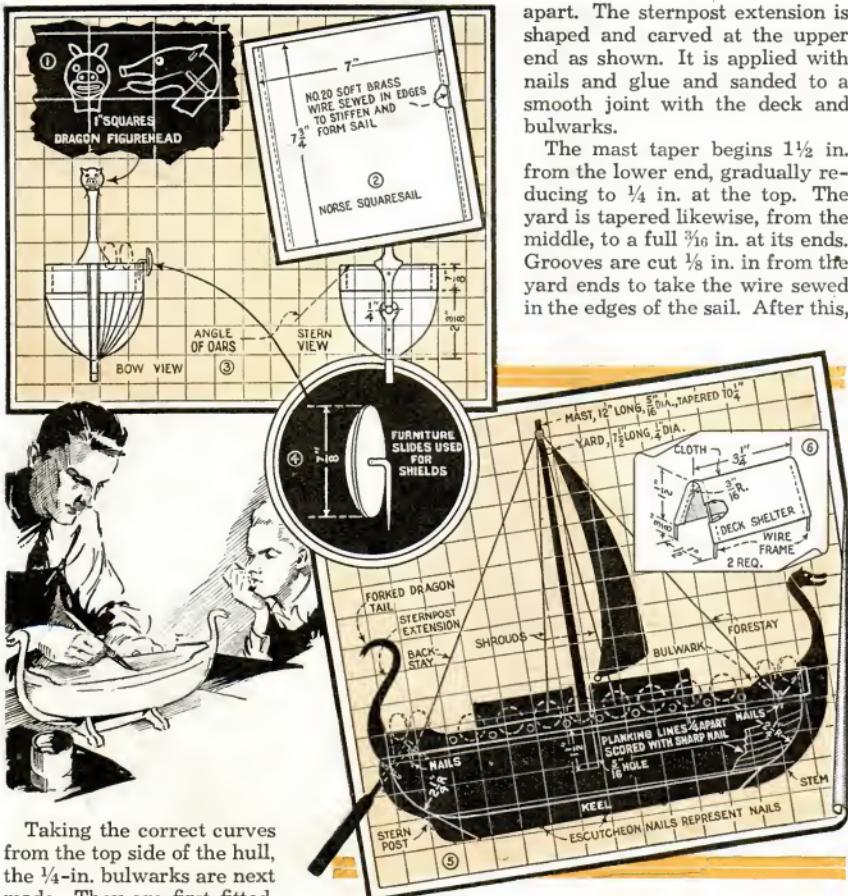


*a simplified job
for beginners*

By
JOSEPH MINAROVITCH

AS a decorative model, the Viking ship is one of the easiest types to build and is ideal for the beginner. The hull is carved first. Draw a centerline the length of both top and bottom. Then, $2\frac{3}{16}$ in. from each end of the top, a mark is made at the edges of the block. These marks indicate where the curves of bow and stern merge with the straight midship section. The curves are marked in and cut to shape with a coping saw. Paper patterns are made of the stem and sternpost, Fig. 9, and, on the sides of the block, these curves

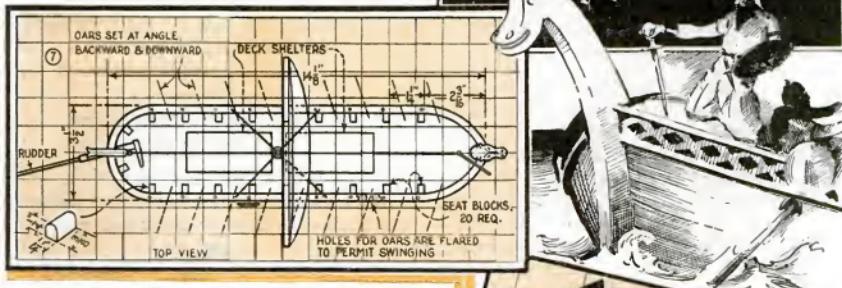
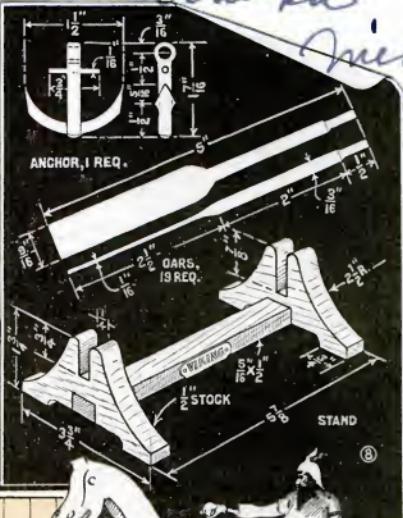
are also marked in and later cut away. The block is then cut to shape and sanded. In the crosshatched drawings, each square represents 1 in. Next, paper patterns are used for the $\frac{1}{4}$ -in. stem and sternpost, which are cut to shape and fitted to the hull block. They are temporarily nailed in place and, with the hull bottom as a third side, the keel piece is marked for shape and size and is cut out. All three pieces are given a final sanding and are nailed and glued to the hull block with waterproof casein glue.



Taking the correct curves from the top side of the hull, the $\frac{1}{4}$ -in. bulwarks are next made. They are first fitted, then drilled at points indicated in the side and top views, Figs. 5 and 7, for oar holes, nailed and glued in place and finally sanded flush with the hull sides. In the stern view, a diagonal $\frac{1}{4}$ -in. hole is drilled for the rudder. Before doing this, two small blocks of wood are glued alongside the sternpost to provide the rounded section at this point. The hole should be drilled from the outside to prevent splitting the sternpost or getting the hole off-center. Halfway between stem and stern, a $\frac{5}{16}$ -in. hole is drilled $1\frac{1}{2}$ in. deep for the mast. Hull and deck are marked to represent planking. The hull lines are $\frac{1}{4}$ in. apart; those on deck, $\frac{1}{8}$ in.

Twenty seat blocks are made and they are glued to deck and bulwarks. Some of the painting should be done now. The hull is dull yellow; bulwarks dull red, inside and outside; the mast and spar white, except for a $\frac{1}{2}$ -in. black tip topping the mast, and the deck and seat blocks are shell-lacked. The stem, keel, sternpost and its extension are yellow. When the paint is dry, the hull is antiqued by applying a thin coat of burnt umber, which is wiped off when partly dry. The stem, keel, stern-post, extension and dragon's head are now stippled with red, green and black to represent serpents' scales. The nail points of

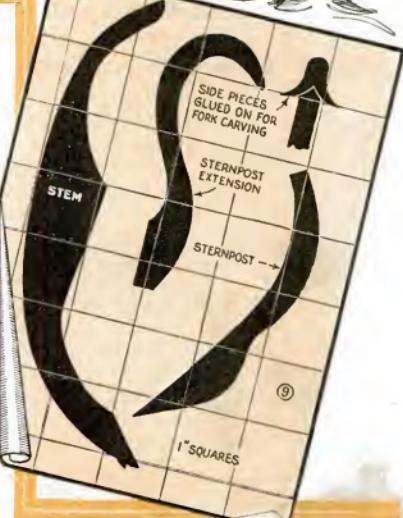
the furniture slides are bent at right angles to set in holes drilled in the bulwark tops. These units are painted dark brown all over, or, they may be decorated with heraldic designs. The mast is rigged with three shrouds, a side, a fore and a back-stay. The yard is lashed to the mast about an inch down from the top. Using the soft brass wire, sewed in seams at the sides of the sail, the sail is hung from the ends of the yard. The size of the sail is given in Fig. 2. It should also be antiqued with burnt umber. The lifts and sheets constitute the running rigging. The deck shelters, Fig. 6, are made and antiqued and put in place, the wire frames fitting into holes drilled in the deck. The anchor is fastened from brass rod or sheet lead, painted black and hung in place. The oars and rudder are whittled and attached by



light nails driven down through the bulwarks. The base, of mahogany or walnut, Fig. 8, completes the job. Small wood screws are driven through the base into the hull.

Dummy Helpful in Determining Scale Details of Model

If dimensioned details are missing from plans of a model, the size of the parts can be determined by their relation to a small dummy of a 6-ft. man, this being made to the same scale as the ship. Thus, if the doorway is to be cut, the dummy is held vertically against the bulkhead, which is then marked just above the end of the stick, allowing extra height for clearance. Notches may be cut in the stick to represent knee and waist heights for locating bitts, gun carriages and steering wheels.—Harold T. Bodkin, Chicago.





Soot Raked into Sheet-Metal Container That Fits into Cleaning Hole of Stove

Soot Removed from Stove without Soiling Floor

Accumulations of soot under an oven on a cookstove can be removed without mussing the floor by using this tin container and the cleaning hoe. The loop at the end of the hoe handle is straightened and a wood block is slipped over it and fastened in one end of the container. The assembly is then slipped into the opening under the oven and the soot is raked into the container which is then removed.

Large Envelope Made from Two Small Ones



If a large envelope is not at hand for mailing pictures, drawings, cards or similar items, one can be made by arranging two common envelopes as shown in the drawing. The item to be mailed is placed in one of the envelopes and the other one is put over it, placing it so that the gummed flaps are on oppo-

site sides. Both flaps are then sealed.—Martin G. Winterton, Fort Lewis, Wash.

Simple Method of Removing Rind from Bacon

Many people who experience difficulty in removing the rind from a piece of bacon will find that the illustrated method solves their problem. Place the bacon, rind side down, on a flat surface and hold it down firmly with one hand. With the other hand, start the knife with a sawing motion between the fat and the rind, pressing the blade firmly against the rind. With this method, the knife will make a clean cut across the entire piece.



Canvas Seat for Child's Use at the Movies

When attending a movie with a small child, this canvas seat stretched between the arms of a theater chair will raise the

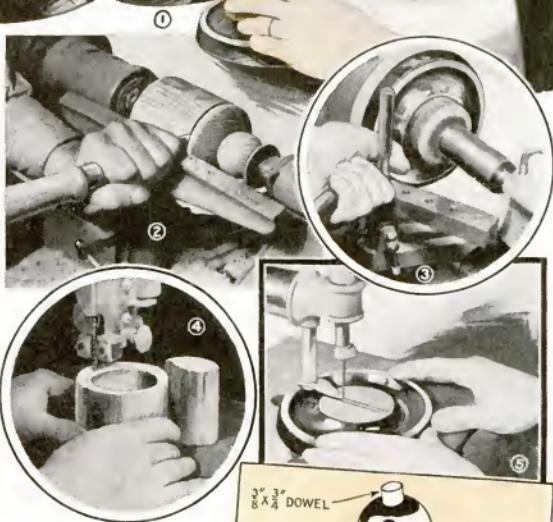
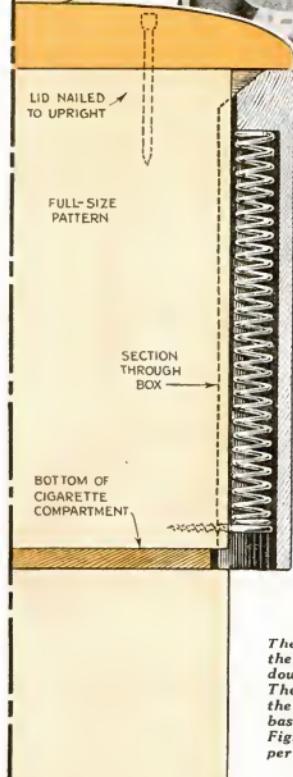


Heavy Canvas Seat Stretched between Arms of Theater Chair Enables Child to See Movies

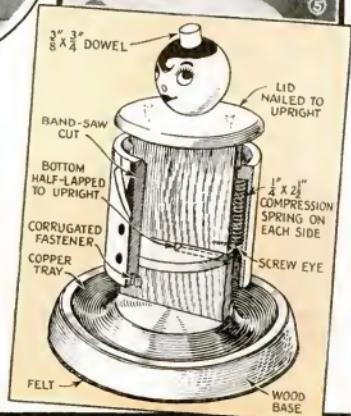
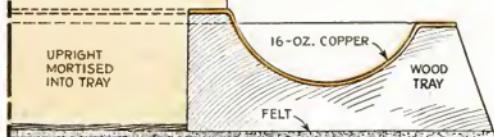
child so that it can see over the heads of people in front. The seat can be folded and carried in the pocket, and consists of a square of heavy canvas with wire hooks sewed to the corners as shown.

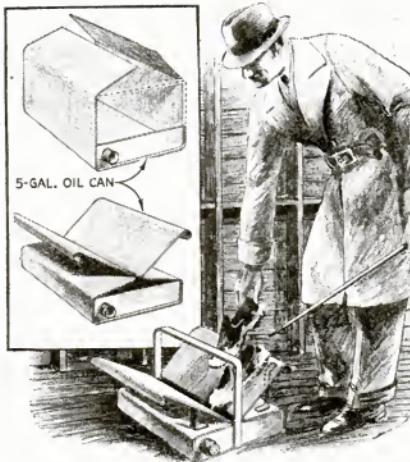
HAVE A SMOKE

*...if you can find
the cigarettes!*



The lid won't come off but the coat does, Fig. 1. Turn down the top as in Fig. 2. The inside cut, in making the coat, and the slit in the base are cut on a band saw, Figs. 4 and 5, and sheet copper is then spun over the base as in Fig. 3.





Wet Rubbers Prevented from Mudding Floor by Setting Them in This Drip Pan

Drip Pan Holds Wet Rubbers

To save the work of cleaning up water puddles from rubbers set on the floor, this drip pan will be found convenient. It is made from a discarded 5-gal. oil can. Portions of the top and bottom are cut out to leave a shallow pan, including the spout, which will be needed for draining. The sides of the can are evenly separated and are bent down to form a trough and are supported by four iron braces soldered in place. A $\frac{1}{2}$ -in. opening in the bottom of the trough allows water to drain into the pan. If desired, a flat-iron handle may be soldered to the ends of the pan.

Sanded Space on Glass Graduate Helps Prevent Errors



surface to indicate their respective measures.
—G. E. Hendrickson, Argyle, Wis.

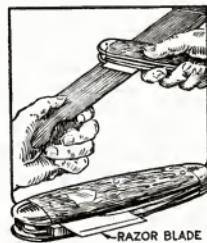
To prevent errors in measuring different kinds and quantities of chemicals, an amateur chemist sanded one side of his glass graduate, and, with a lead pencil, wrote code letters and arrows on the sanded surface to indicate their respective measures.

Repairing Leaky Iceboxes

If your icebox leaks, it can usually be repaired by coating the inside of the ice compartment with paraffin. Just take out the metal stand that supports the cake of ice, plug the drain with a cork, and then pour melted paraffin over the leaky part. After the wax has hardened, carefully remove the cork from the drain and replace the stand.—James W. Campbell, Hartford, Connecticut.

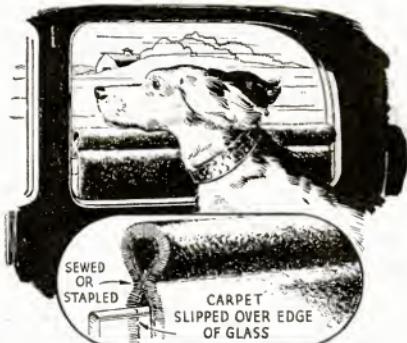
Pocketknife Holds Razor Blade While Stropping

To hold a safety-razor blade for stropping, or to handle it conveniently for cutting paper, open one blade of a pocket-knife, place the razor in the slot, as shown, and close the blade.



Auto Window Cushioned to Prevent Injury to Dog

If your dog rides in a car with its head out of the window, cushion the edge of the lowered window glass so that the dog

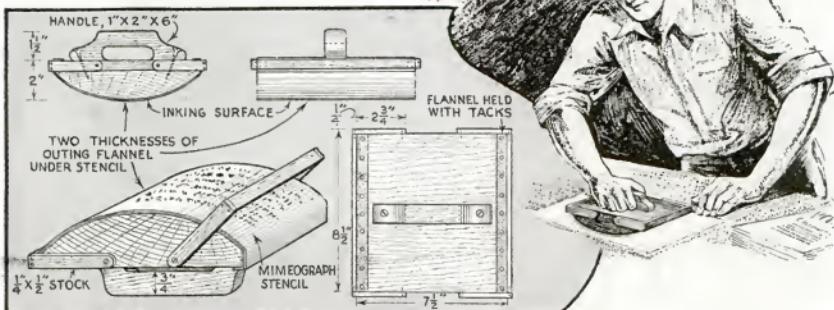


Strip of Old Carpet Folded over Car Window Protects Dog When Car Hits Bump

will not be injured when driving over rough roads. A good pad for cushioning the glass can be made by folding a strip of old carpet and stapling or sewing it as indicated in the detail.

Stencil Paper Used on Homemade Duplicator

Here is a homemade duplicator that is useful for printing invitations, handbills, menus, programs, etc. Practically all the

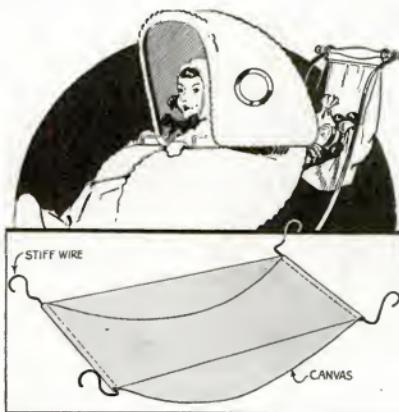


cost involved is ink and stencils. To make the duplicator, get a wood block and carefully shape one side to a curvature having a radius of about 6 in. The curved surface must be perfectly true so that in rocking it across a flat surface, all parts will touch. Then cover the block with two layers of outing flannel stretched tightly and tacked along the edge to the top side of the block. The fleece side of the cloth should be inside. Two clips are made of wood or flat metal and are pivoted to the block so that they will hold the mimeograph paper securely. A handle completes the job. Ink

and stencils can be obtained at mail-order houses or typewriter-supply concerns. Be sure to ask for duplicator ink. The stencil, cut on a typewriter or written by using a stylus, is attached to the duplicator after the pads have been inked. Ink the pad well but do not make it soggy. The stencil is placed over the inked pad with the side down that your typewriter keys struck. It should be possible to print at least two hundred copies before re-inking. If too much ink gets on the printing side of the stencil, wipe it off with a cloth moistened with alcohol.—Don Mayes, Carthage, Mo.

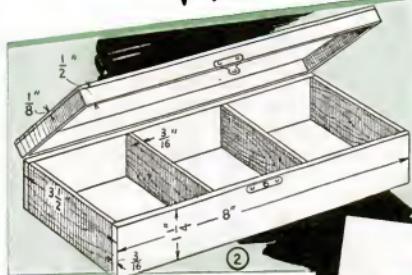
Canvas Pouch on Baby Carriage Holds Small Packages

To carry packages on her baby carriage, one woman made a pouch, or pocket, as shown in the detail. It consists of canvas sewed over lengths of heavy, stiff wire, the ends of which are bent to form hooks to be slipped over the handle and the rear edge of the carriage body. When making the pouch, cut out the sides to a radius large enough to give it considerable depth, and then sew them to the bottom. It is a good idea to slip short lengths of small rubber tubing over the hooks to prevent marring the finish on the carriage. The pouch will also serve as an extra seat for an older child by using heavier wire for the hooks and cutting a couple of slits in the bottom for the child's legs.—A. H. Waychoff, Tempe, Ariz.



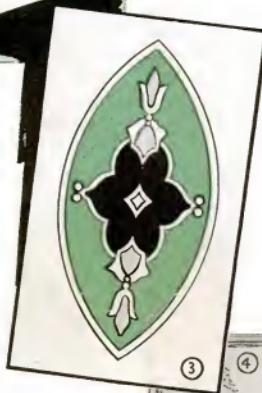


What you can do



WAX crayons, such as children use to color pictures, have many other uses. Art training is not required to use this versatile and inexpensive material, as one need only follow a few simple directions to produce some of the beautiful effects that are illustrated.

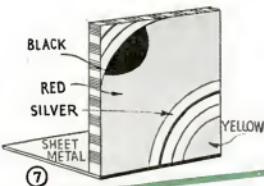
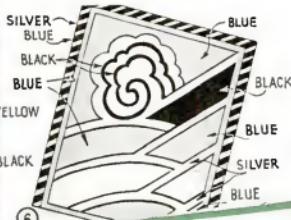
For tinting photographs, Figs. 8 and 10, excellent results can be obtained by even a novice, especially on landscapes. The advantage of using this material is that it does not penetrate and can be wiped off if the results are not to your liking. Photographs to be tinted should be printed on dull paper. The surface is first cleaned by wiping it with a cloth on which talcum powder has been sprinkled, to remove any oiliness. The crayon may be either applied directly to



the photograph, then blended out to a tint with a bit of cotton dipped in carbon tetrachloride, or the color may be applied directly to the cotton. For small details, a brush may be substituted for the cotton and the color applied to the wet brush.

Small wood objects, as in Fig. 1, can be stained beautifully by covering the entire surface with the color selected, rubbing it in the direction of the grain where possible, then rubbing the surface with a soft cloth dampened with gasoline. The gasoline dissolves the crayon, thus setting the color in the wood and removing the excess wax. Further rubbing with a dry flannel cloth will produce a durable wax finish. Dimensions for a cigarette or trinket box

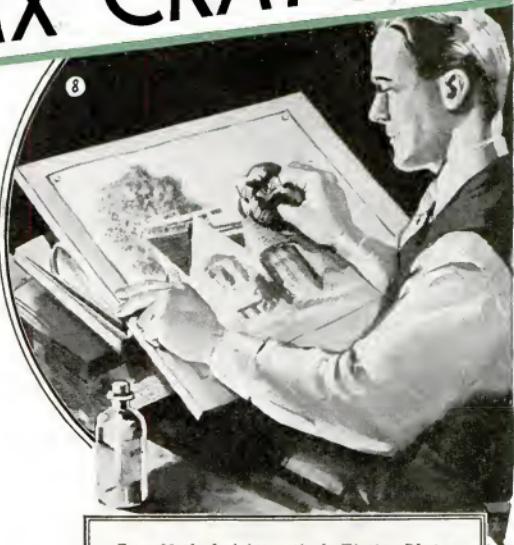




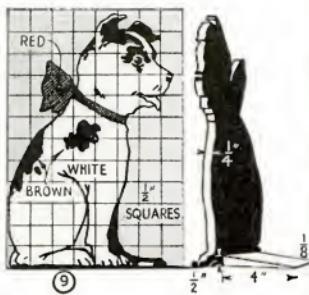
with WAX CRAYONS

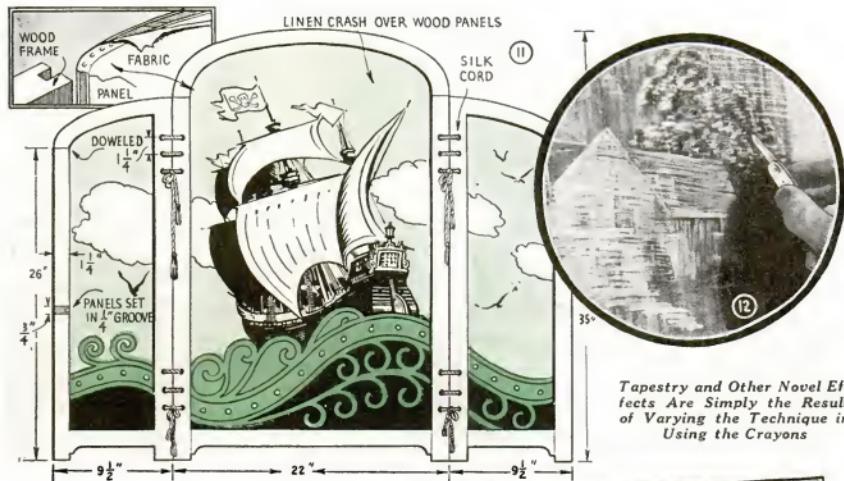
are given in Fig. 2. If you wish to decorate the box, you may use the design shown in Fig. 3. Trace the design onto the surface with carbon paper, then fill in with the colors desired as in Fig. 14. A thin coat of white shellac is used to prevent the crayon from wearing off. The doorstop, Fig. 9, and the book ends in Figs. 5, 6 and 7, are suitable for this type of decoration.

Work carved in low relief is attractive when finished as follows: Brush a coat of a mixture of gasoline, 10 parts, to gray green oil paint, 1 part, over the surface. While the work is still wet apply the crayon to produce a two-tone effect. If unusual shades of stains are required for matching colors when patching fur-



Easy Method of Attractively Tinting Photos by Using a Wad of Cotton Dipped in Carbon Tetrachloride, and Ordinary Wax Crayons

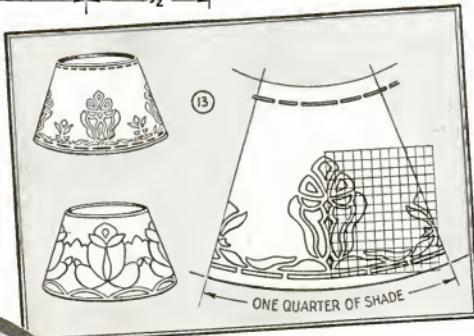




Tapestry and Other Novel Effects Are Simply the Result of Varying the Technique in Using the Crayons

niture finishes, pottery, mirror frames, etc., they can be produced by mixing crayons. The shavings of crayon are dissolved in turpentine, which must be warmed in a double vessel and stirred thoroughly. With so many colors available, almost any shade can be obtained by mixing.

A beautiful tapestry-like effect



is shown in Fig. 16. The design is drawn on thin paper with orange crayon, pressing quite heavily. The paper is then laid, face down, on the fabric you wish to decorate and the design transferred to the fabric by pressing the back of the material with a hot iron. The next step is to stretch the fabric on a drawing board with thumb tacks and fill in the various colors of the design quite heavily with crayons. After the design has been colored as desired, the fabric is laid, face down, between sheets of newspaper and covered over with a damp cloth. The steam, produced by running a hot iron

over the cloth, as shown in Fig. 15, will dissolve the crayon, depositing the wax onto the paper but setting the colors into the fabric. The process is so effective that the material may be washed without destroying the design. Fig. 11 shows an attractive fire screen that can be made in this way. After the fabric panels are finished, they are stretched over wood panels and tacked along the edges as shown.

Lamp shades, Fig. 13, and antique maps,

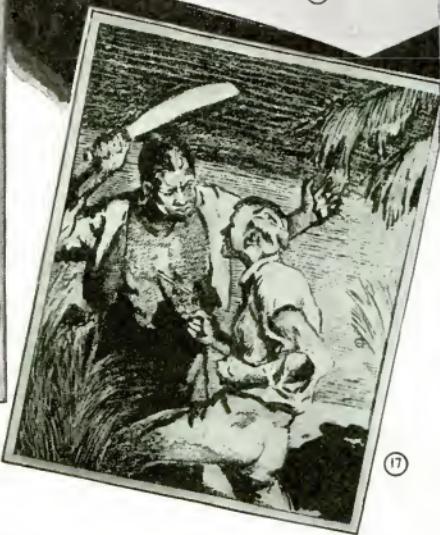
(16)



Fig. 4, present another field for the use of wax crayons. Both lamp shades and maps are made with a parchment-like oiled paper. This can be prepared by coating white drawing paper with a solution of boiled linseed oil mixed with a small amount of benzine. A smooth-surfaced paper will give an even tinted effect while a rough texture will produce a mottled one. The design, which must first be worked out in a pattern, is simply outlined on thin paper with a sharp crayon and transferred to the parchment paper by placing the pattern on the parchment and pressing with a hot iron, as before. The mass coloring is then filled in directly on the parchment with crayons. In order



(15)



(17)

to tone down the colors and give a soft, aged appearance, all that is necessary is to lay the colored portion on a piece of newspaper and go over the back with a hot iron, to remove the surplus crayon and wax.

Beautiful etching effects can be obtained on paper or linen-finished illustration board by a scraping process, Figs. 12 and 17. After the picture is drawn and shaded with crayon, take a penknife and scrape fine lines, exposing the paper underneath.



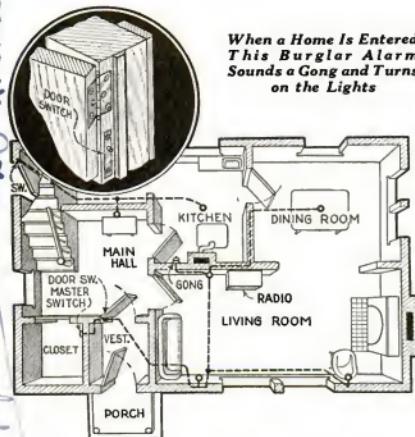
Section of Inner Tube Filled with Sawdust Makes Good Shoulder Pad for Carrying Ladder

Pad for Carrying Ladder Made from Inner Tube

A short section of inner tube filled with sawdust or shavings provides a good shoulder pad when carrying a ladder. The pad is nailed to the inside of one of the rails near the center so that the ladder can be balanced on the shoulder.

Simple Burglar Alarm Operated by Door Switches

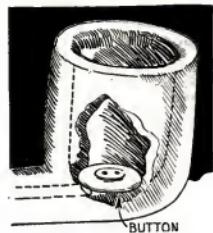
Here is a method of putting in your home a burglar alarm which utilizes door switches to turn on the lights, sound a gong or even turn on the radio when a



door or window is opened. A careful study of the drawing will show the method used. A switch is installed in the sill of each window and the casing of each outside door so that the circuit is closed when any one of them is opened. A master switch is used to cut out the alarm when not in use. The alarm circuit is connected into the lights between the wall switches and the lamps so that when the alarm is turned on the lights work independently of the regular house circuit.

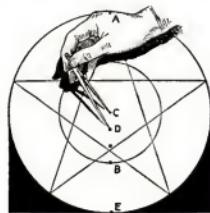
Button Improves Smoker's Pipe

Placed in the bowl as indicated, a button will be found a great aid to smoking enjoyment. Small particles of tobacco are prevented from entering the pipe stem and the tobacco is kept dry and mellow by being held above the bottom of the bowl, which is usually wet or damp when the pipe is in use.—Sigmund Sameth, New York City.



Drawing a Five-Point Star

Here is one of the simplest methods of accurately drawing a five-point star that I have ever found. With a compass, scribe a circle equal to the desired diameter of the star, and, inside of this, scribe a second circle one half the size of the first one. Then divide the distance CB into three equal parts to get distance CD. The distance AD now equals one-fifth of the circumference of the large circle, which, when divided, gives the five equal points of the star as shown.—T. F. Zimmerman, Beverly, N. J.

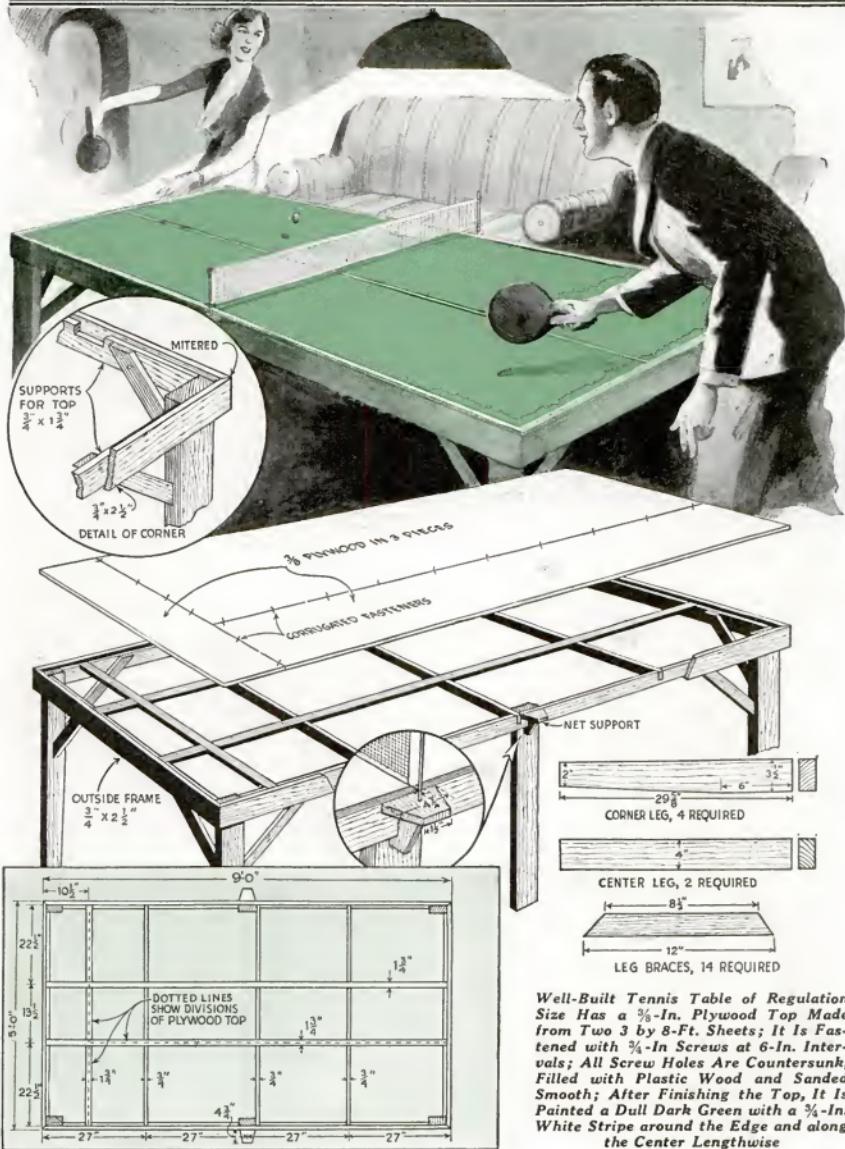


Tea stains on cups and saucers can usually be removed with damp salt.

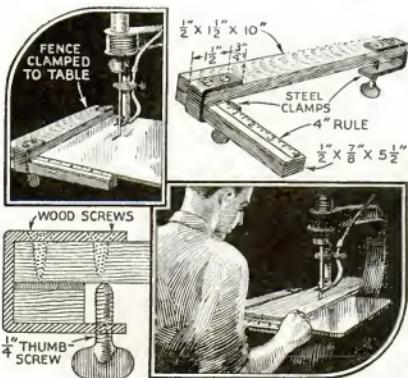
*Auto Power
408 W. Hoyne Av Chicago*

BP 1082

Regulation Size TENNIS TABLE



Well-Built Tennis Table of Regulation Size Has a $\frac{3}{8}$ -In. Plywood Top Made from Two 3 by 8-Ft. Sheets; It Is Fastened with $\frac{3}{4}$ -In Screws at 6-In. Intervals; All Screw Holes Are Countersunk, Filled with Plastic Wood and Sanded Smooth; After Finishing the Top, It Is Painted a Dull Dark Green with a $\frac{3}{8}$ -In. White Stripe around the Edge and along the Center Lengthwise



Ripping Fence Clamped to Jig-Saw Table Is Provided with Rule Which Is Set for Width

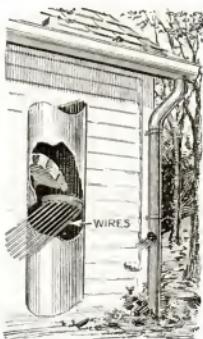
Ripping Fence for a Jig Saw

For use on any jig saw having a square table, this ripping fence is easily attached or removed, and is quickly set to the desired width. It consists of two wood blocks glued together at right angles, the shorter one of which has a 4-in. rule glued to the top surface. Two U-shaped steel clamps are screwed to the fence and are fitted with thumbscrews to hold it to the table.

Self-Cleaning Strainer Prevents Leaves from Entering Cistern

Home owners who have cisterns and have trouble in keeping the strainers in the eave conductor pipes from clogging will find this self-cleaning strainer a solution to their problem. A section of the conductor pipe is removed and an opening about 1 in. wide is made in one side.

Directly above this a tin baffle plate is soldered inside of the pipe so that it rests at a 45° angle. The strainer, which consists of several stiff wires spaced $\frac{1}{4}$ in. apart and soldered at one end to a tin strip, is soldered to the opposite side of the conductor pipe so that the wires slope at an



angle, with the free ends projecting out of the opening. In this way, the baffle throws the water to one side of the conductor pipe where it passes through the strainer, while leaves and trash slide down the wires and out of the opening.

Improving an Ice-Pick Handle

To make an ice-pick handle more effective when using it to break up small chunks of ice, drive a couple of furniture slides into it near the end as shown. This makes the part of the handle contacting the ice more solid and also helps to prevent it from splitting. If a short section of rubber tubing is slipped over the point of the pick, a better grip for the hands will be provided.—F. W. Bentley, Missouri Valley, Ia.



Electric Clock on Lamp Shade

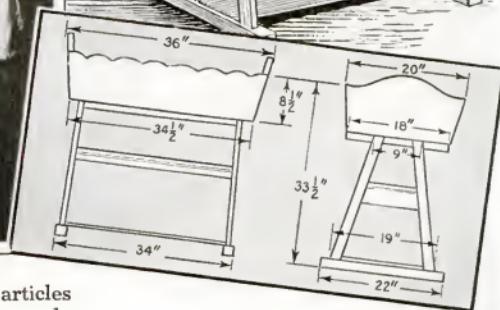
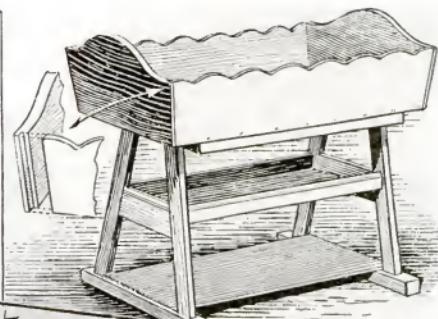
To add a touch of novelty to your table lamp, an electric-clock works can be installed on the shade. The hands are re-



moved from the clock, which is then fastened inside of the shade with small staples or metallic cement. The hands are put back on the shaft, which projects through a small hole made in the shade. The numerals are painted on the lamp shade with a paint that contrasts with the color of the shade so that they are visible. The clock wires should be connected into the lamp circuit so that turning off the lamp will not stop the clock.—Richard Besocke, Highland Park, Ill.

When painting or varnishing steps, it is a good idea to leave alternate ones to walk upon while the painted ones are drying.

Baby Clothes and Linen at Hand under Crib



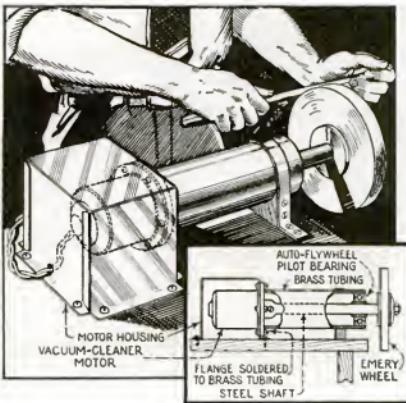
Baby clothes, linen and other articles are always at hand when kept on a couple of shelves located under this baby crib. The four legs extend at a sufficient angle to assure good support so that the crib cannot be tipped over. Crosspieces are used to brace the legs and to hold two shelves and the crib itself. To enhance the

appearance of the crib, the sides and end may be cut to a pleasing curvature. After sanding the surface of the wood, especially the edges of the crib, apply a coat of shellac to serve as a filler before painting.—C. E. Johnson, Chicago.

Old Vacuum Cleaner Motors Useful in Home Workshop

Motors from old vacuum cleaners may be used to drive small emery and light buffing wheels. An extension shaft is attached to the motor and the whole assembly is inclosed in a housing. The idea is to provide a suitable extra bearing, preferably a ball bearing, to take the strain of grinding and buffing. To do this, the bearing is inclosed in a brass tube and an extension shaft is attached to the motor. Another reason for the extension is to prevent emery dust from getting into the motor bearing.

Growth of algae (green scum) in a lily pool containing goldfish can be controlled by putting a few pennies or small pieces of copper in the water.



HOME

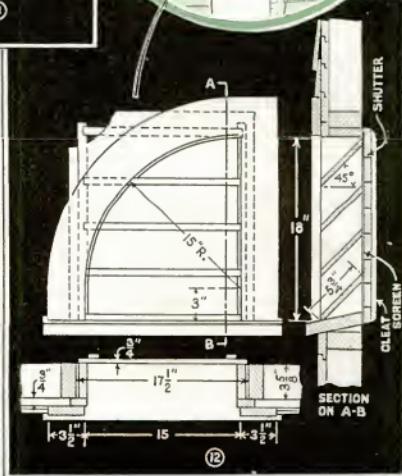
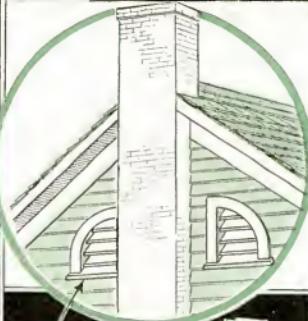
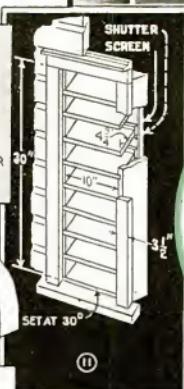
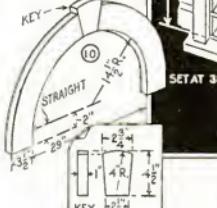
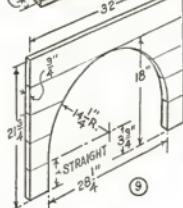
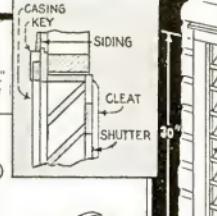
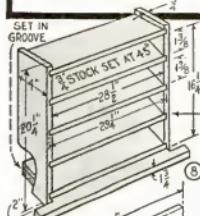
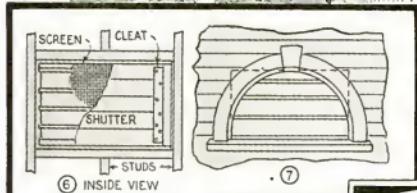


THIS efficient kitchen ventilator will quickly carry away cooking smoke and odors. First make the wood frame, Figs. 1, 2 and 3, which has $\frac{1}{4}$ -in. saw cuts to house the sheet-metal diaphragm and shutter frame. The diaphragm has a circular hole $\frac{1}{2}$ in. larger than the fan blades. The shutter leaves, Fig. 5, are made of sheet metal with one edge rolled over a piece of $\frac{1}{8}$ -in. brass rod, which will not rust and cause the leaves to bind. The bottom edge of the top and center leaves are off-set slightly so that they will

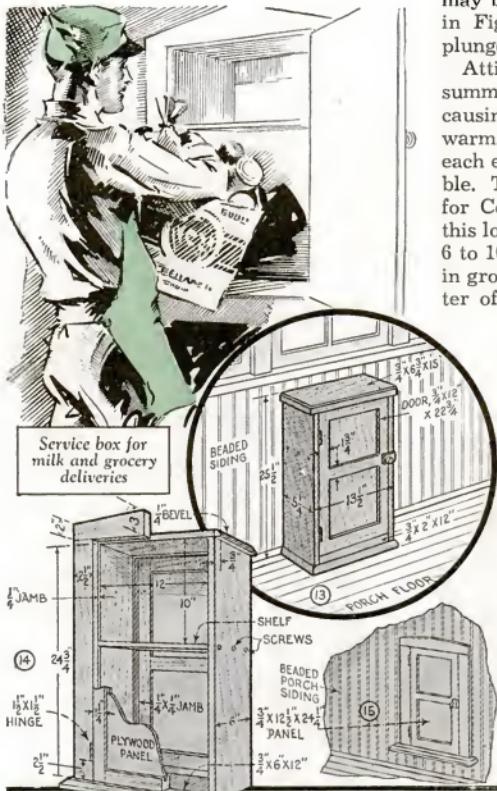
IMPROVEMENTS



Louvres assure circulation of air through attics



overlap the rolled edge of the leaf underneath. Fig. 5 also shows the copper or brass straps used to mount the leaves on the frame. Strap-iron arms operate the leaves. Woven picture wire should be used to link the leaves together by knotting at each of the holes in the arms so that the cable will pull in either direction. Unless the leaves are made of rather heavy metal, it is advisable to add a return spring as in Fig. 4. A small metal angle is screwed to the door to fasten the cable, Fig. 3. This should be located and the cable length adjusted so that the leaves of the shutter and the door will be open at the same time. A spring switch



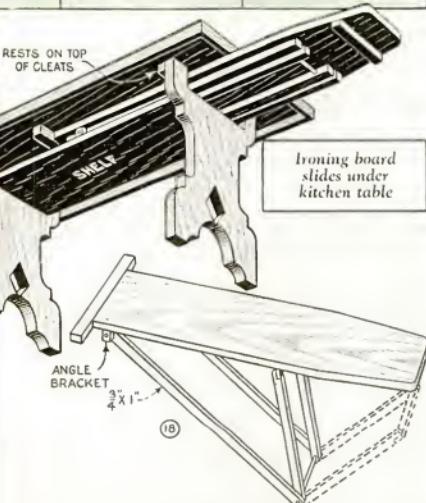
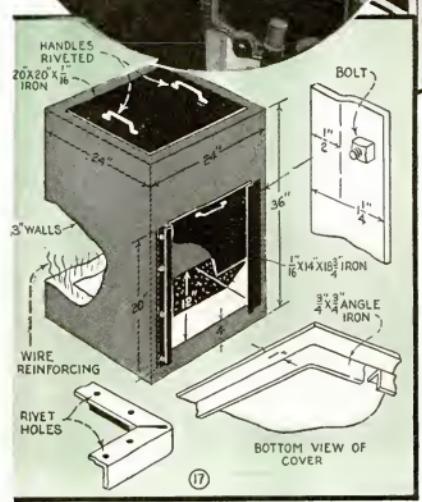
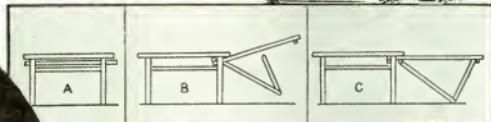
may be purchased and installed as shown in Fig. 1. Closing the door pushes the plunger in and thus shuts off the fan.

Attics without ventilation become hot in summer, holding the heat over night and causing the rooms below to become very warm. Installing an attractive louver in each end of the attic will remedy this trouble. The type shown in Fig. 7 is suitable for Colonial houses. The construction of this louver is not difficult as shown in Figs. 6 to 10. The leaves and sill are all housed in grooves. If a chimney runs up the center of the gable, two quarter-round louvers, as in Fig. 12, may be used. For English-type houses, a long narrow louver as in Fig. 11 is most suitable. On this type, where many leaves are used, an angle of 30° gives the best appearance, but the leaves must be fitted with back strips to prevent the rain from driving in.

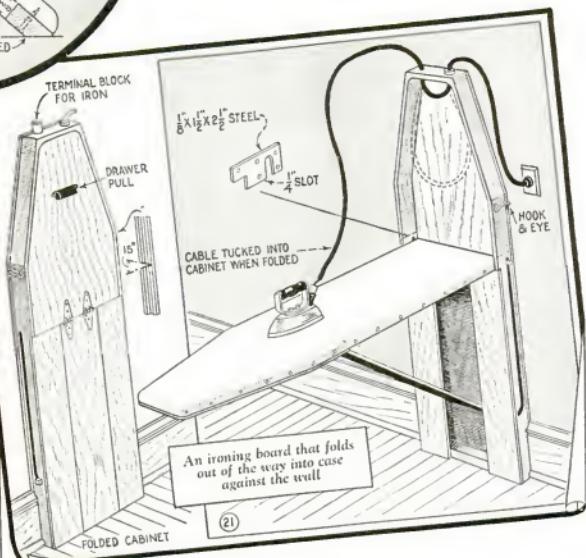
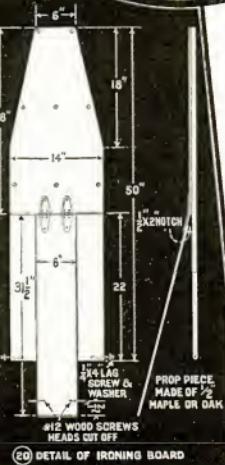
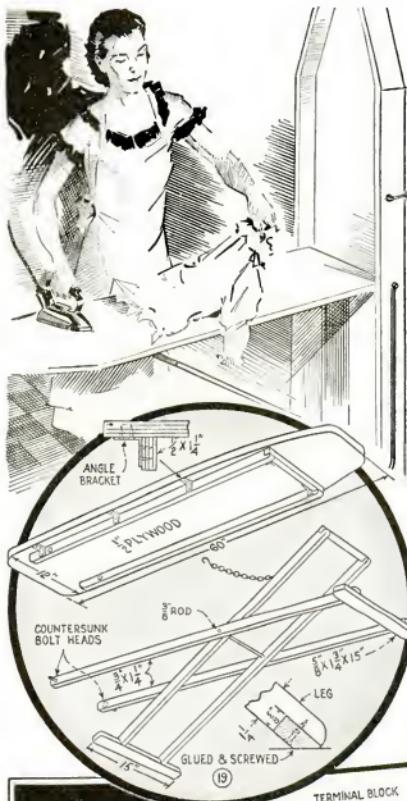
A service case, built into the back porch, provides for milk and grocery deliveries. Fig. 13 gives the inside arrangement and Fig. 15 shows how it looks from the outside. The dimensions given in Fig. 14 provide ample space.

Cement garbage containers may be built as in Figs. 16 and 17. Simply construct the outer and inner

wood forms, and you are ready to pour the concrete. The front opening is provided by a simple frame nailed to the outer front panel and fitting flush against the inner form. First set up the outer form and fill it with concrete up to the level of the bottom of the front opening, about 4 in. A mixture of one part of cement, two of sharp sand and four of medium gravel is about right. The inner form is hung from cleats across the top. Pour the concrete between the forms to a depth of 3 or 4 in. then tamp down, repeating the process until the form is filled to the top. It is advisable to reinforce the concrete by throwing in pieces of old wire at each tamping except the last. Allow the con-



crete to set 48 hrs. before removing the forms. The inner one should be removed first by breaking out the key cleats and pulling the panels toward the center. A sheet-metal door is arranged to slide in metal guides to close the front opening. The top cover is also made of sheet metal with an angle-iron ledge, the size of the opening in the container, riveted to the



underside. Angle-iron frames can be easily made by cutting V-notches as indicated in the photograph.

Fig. 18 shows a small ironing board that slides under the breakfast-nook table when not in use. The top is cut the length of the table. The legs are made of $\frac{3}{4}$ by 1-in. stock with a bar hinge at the bottom and one pair of legs pivoted on angle brackets under the board. Another light ironing board can be made of $\frac{1}{2}$ -in. plywood, as in Fig. 19. The X-legs, attached to the board, can be folded up and laid flat between two parallel braces beneath the board. The legs are best made of spruce for strength and lightness. Bolts with countersunk heads secure one pair of legs under the large end of the ironing board and a chain is installed so that, when hooked up, the legs will not collapse when the end of the ironing board is lifted to slip a garment over it. A third type of ironing board is shown in Figs. 20 and 21. In homes not provided with a built-in ironing board this will serve as a good substitute and can be located in a convenient location with a wall plug near by. As can be seen from the illustrations, this board is a combination sliding and pivoting affair, and fits in a shallow case permanently attached to the wall.

Novel, Artificial Flowers Made from Tin Cans



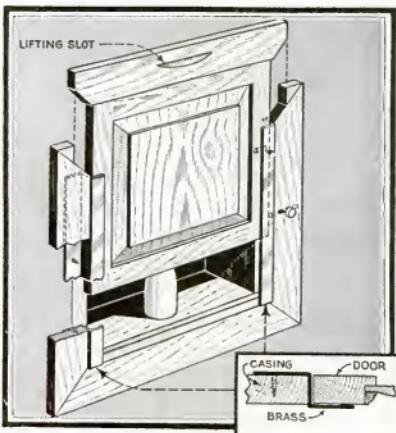
An interesting hobby is to make artificial flowers from tin cans. Select a bright clean can, remove the paper covering, and with a pair of tin snips or old scissors, cut down along the vertical seam to the bottom. After cutting off the rim at the top, which is discarded, cut the entire can into horizontal strips about $\frac{1}{16}$ to $\frac{1}{8}$ in. wide, stopping at the seam and leaving the bot-

tom intact to form a base. Then twist the strips to simulate stems, keeping the vertical seam well in the center so that it is hidden from view. Buds and flowers can be made from colored Cellophane and even gum drops; they may be fastened to the stems by bending the latter around them. A coat of clear lacquer will prevent the tin from tarnishing.

Preventing Entrance to Home through Milk-Door Opening

Entrance of a burglar through a milk-delivery opening of a home or apartment can be prevented if the inside door of the opening is made to slide up and down, and is provided with a bolt lock on the inside. To do this the door casing is removed and brass strips are bent and screwed to it, as shown, to serve as slides, after which the sides and bottom of the casing are replaced. The top part of the casing is provided with a lifting slot and is then screwed to the top of the door. It is a good idea to use a bolt lock of the concealed type so that the appearance of the casing will not be marred.

If a cup in which molasses is measured is greased with butter or lard, every drop will run out and there will be no waste.



Shields of Light Metal Protect Legs of Cyclist



Leg Shields Clamped to Frame of Motorcycle Protect Rider from High Winds and Storms

A European army officer who rides a motorcycle when on duty, designed the leg shields shown here. They are made of sheet metal, and are bent to the curvature of the legs when the knees are bent, providing protection against cold winds. The shields are bolted to pieces of flat iron, which are clamped to the motorcycle frame.—T. A. Hodgdon, Wilbraham, Mass.

Sections of Coil Spring Anchor Tubing or Electric Cord to Wall

Short sections of a coil spring taken from a window-shade roller make good anchors for fastening small tubing or electric cords to walls and ceilings. The end coils of each section are bent outward, after which the spring is slipped over the tube or cord, and tacked in place as shown.



How to Propagate Rose Bushes

Rose propagation as practiced by many expert gardeners and flower growers can be done easily by amateur gardeners. First cut a slit about 3 in. long in one of the long healthy trailers of the climbing vine.

Do not cut entirely through the trailer, but just about half way. Then bury the trailer 5 or 6 in. in the ground at the point where the slit is made, leaving the trailer attached to the parent bush. Keep well watered and cover with a thick coating of leaves and straw for winter protection. When spring arrives you will find a strong young plant at the point where you made the slit. The old trailer can then be clipped off, and the new bush transplanted.

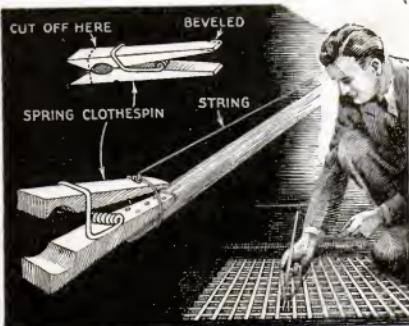
Dustpan Aids in Fighting Fire with Buckets of Water

Held over the mouth of a bucket, a dustpan or similar article serves to make a wide stream for fighting a small grass fire. When poured from the bucket without being retarded, the water covers but little area.



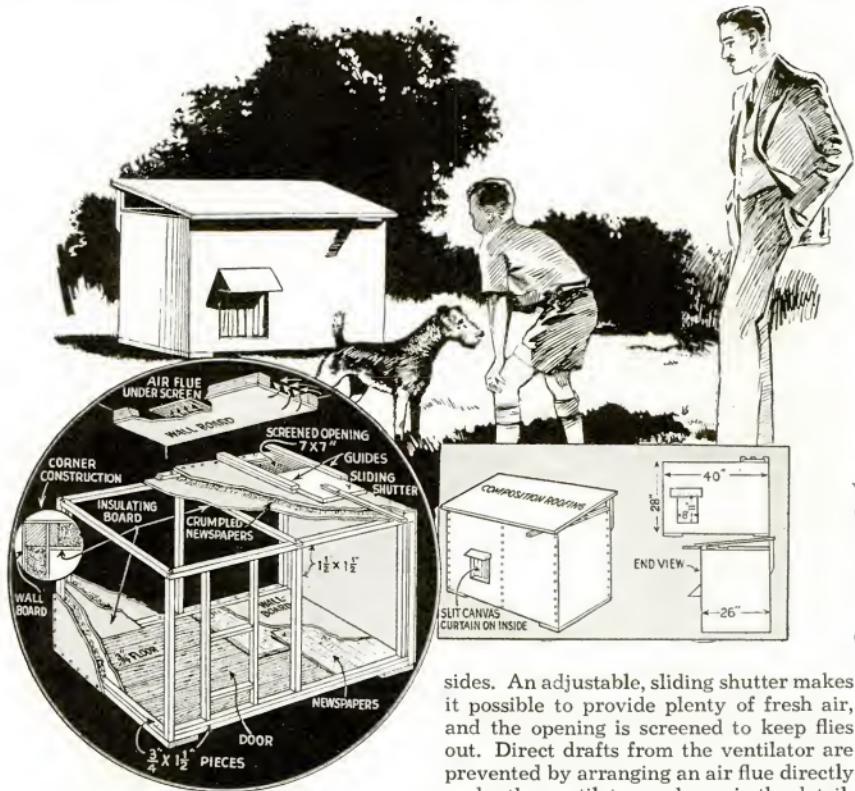
Retriever for Articles Lost under Furnace Grating

Small articles lost under a grating can be recovered quickly with this retriever, which consists of a spring clothespin fastened to one end of a stick. The jaws of the pin are cut off as indicated. A wire ring holds the jaws open over the article to be retrieved, and a jerk on a string, tied to the ring, releases the jaws.



Spring Clothespin Fastened to Stick Makes Good Retriever for Articles Lost under Grating

Snug Dog House Has Adjustable Ventilator



Snug and warm on cold winter days, and cool during hot summer months, on account of its efficient insulation between double walls and floor, this dog house is pleasing to the eye and pleasing to the dog. Although the method of construction shown is applicable to dog houses of any size, the dimensions given have been found suitable for two dogs of fox-terrier proportions. A wooden floor of $\frac{3}{4}$ -in. stock is first laid on two crosspieces, then the framework is set up, which is sheathed on both sides with hard pressed board. Crumpled newspapers are stuffed between the walls. The floor is similarly insulated by laying several layers of newspapers flat and then nailing down a piece of hard pressed board, fitting closely against the

sides. An adjustable, sliding shutter makes it possible to provide plenty of fresh air, and the opening is screened to keep flies out. Direct drafts from the ventilator are prevented by arranging an air flue directly under the ventilator as shown in the detail.

Water System for a Camp Trailer

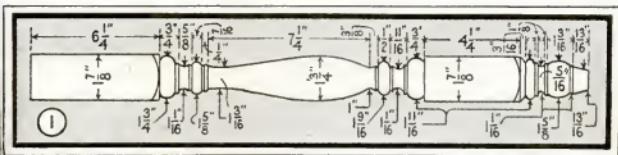
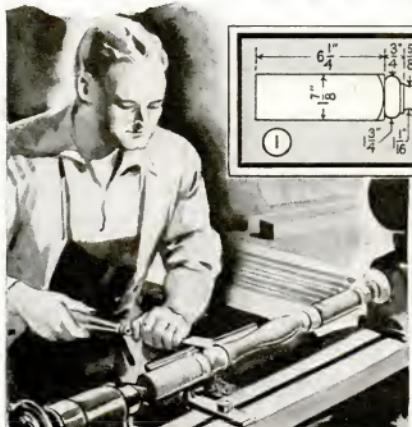
Water-supply tanks are usually located in the tops of camp trailers to permit gravity feed to the sink faucets, which often makes it necessary to drain the tanks when touring so that the trailers will not be top-heavy. It is better to install the tank beneath the sink and use a small gallery pump to raise the water to the faucets. In this way, it is not necessary to drain the tanks. A round or oval tank should be used and the pump connected to it by means of a short hose.

If metal arm or wrist bands that discolor the flesh are coated with nail polish this trouble will be eliminated.

*E. J. Willis & Co
85 Chambers
New York*

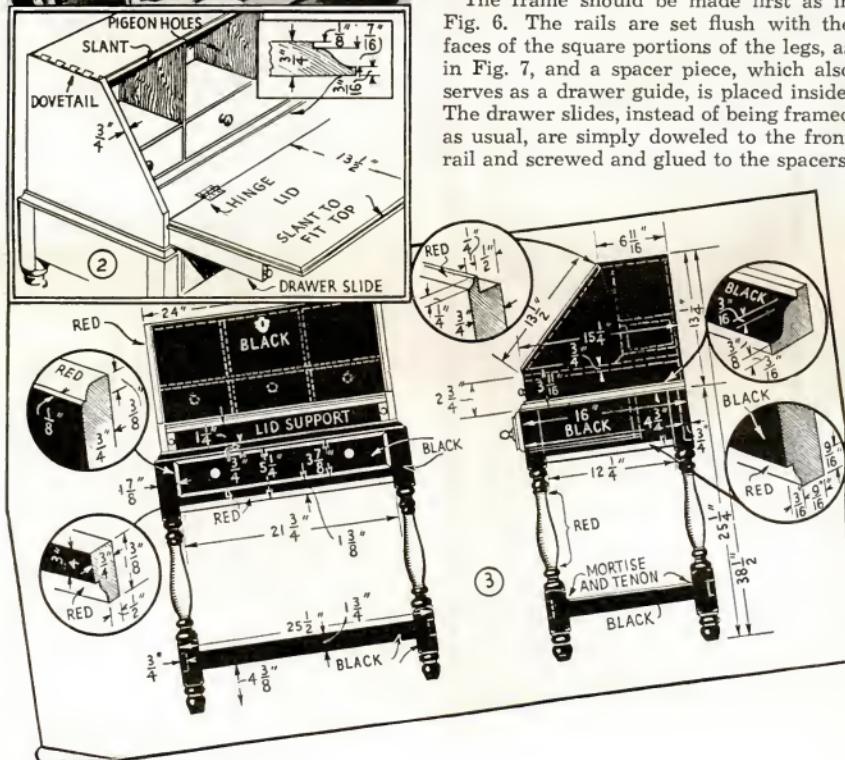
WRITING DESK

me B.P.



THIS well-proportioned desk, which is one of the prized pieces in the Metropolitan Museum collection, was built about 1700. It is unique in that it is one of the few examples of early desks that were built on legs or a frame. The original desk, which was made of white pine, is painted dead black with dull brick-red trimming as in Fig. 3.

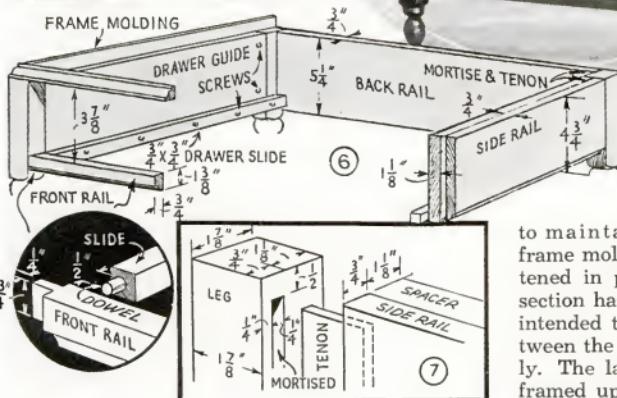
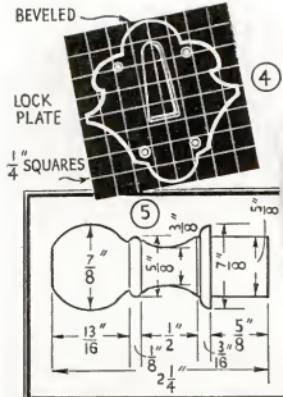
The frame should be made first as in Fig. 6. The rails are set flush with the faces of the square portions of the legs, as in Fig. 7, and a spacer piece, which also serves as a drawer guide, is placed inside. The drawer slides, instead of being framed as usual, are simply doweled to the front rail and screwed and glued to the spacers.



in Colonial Design

By R. O. BUCK

Lane Technical High School, Chicago



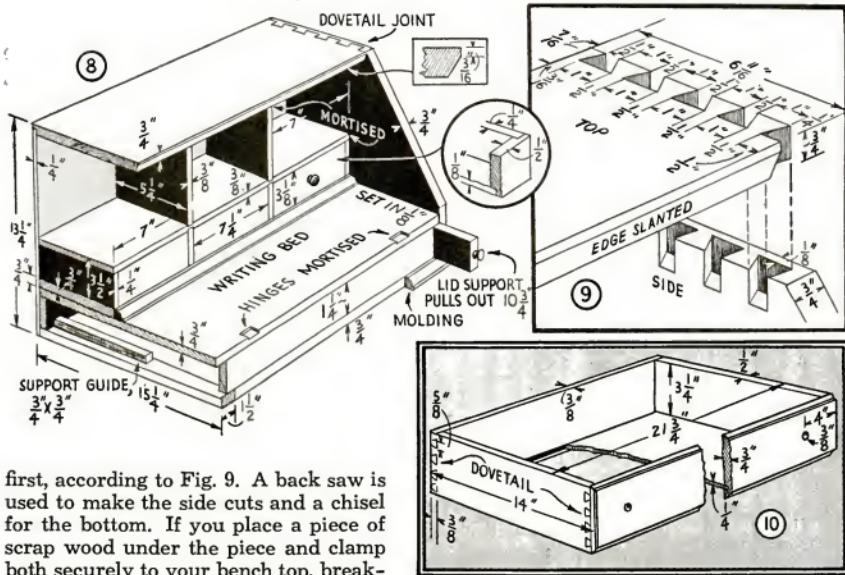
Courtesy of the
Metropolitan Museum
of Art

In making the tenons for the rails the shoulder cuts are made first, then the cheek cuts. The molded lower edges of these pieces can be done on a circular saw, if you have a molding head, or on a universal plane. The legs are turned as in Fig. 1 before mortising. After the joints are cut and fitted, the frame should be set up, glued and clamped. As there is no top rail at the front, a piece of scrap wood should be tacked across the tops of the front legs

to maintain the spacing. The frame molding should not be fastened in place until the upper section has been installed, as it is intended to cover the joint between the two and must fit snugly. The large drawer, Fig. 10, is framed up in the usual way except that the corners are all dovetailed, front and back.

The upper section of the desk requires some wide stock which will probably have to be glued up.

The sides, top and writing bed should be cut to the finished size; then a $\frac{1}{8}$ -in. groove is cut on the inner faces of the side pieces to house the ends of the writing bed. The joints at the upper corners are dovetailed so that the dovetails are hidden on the sides. The dovetails should be laid out and cut on the ends of the top piece

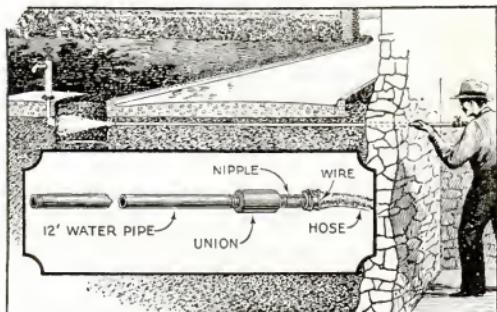


first, according to Fig. 9. A back saw is used to make the side cuts and a chisel for the bottom. If you place a piece of scrap wood under the piece and clamp both securely to your bench top, breaking out chips on the inner face when chiseling will be avoided. The blind dovetails on the side pieces are laid out by placing the top piece in position and marking out the dovetails with a sharp knife. Be sure to mark the portions that are to be cut away as it is somewhat confusing and one can easily cut away the wrong portion. When cutting the square end of the dovetail which leaves a wall only $\frac{1}{8}$ in. thick, it is advisable to support this wall by means of a cleat and hand screws.

The lid supports, pigeonholes, etc., are clearly shown in Fig. 8. To prevent the lid

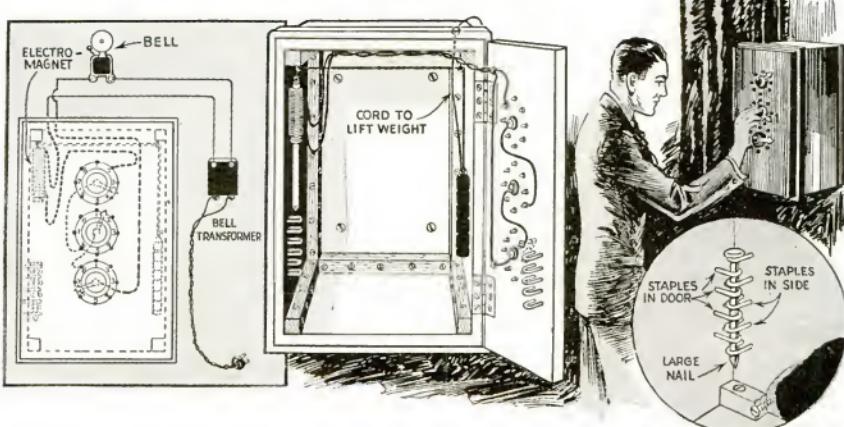
supports from pulling out too far, a hole is drilled near the inner end in which a short piece of dowel rod is glued, to act as a stop. The front edge of the top piece is slanted so that it will receive the lid. When closed, the lip of the lid should be just slightly below the top. In the open position it will rest on the supports as shown in Fig. 2. Long clothespin type wood knobs, as in Fig. 5, are used on the large drawer. The hardware installed before painting consists of hinges, desk lock and a $\frac{1}{32}$ -in. sheet brass escutcheon, Fig. 4.

Water Pressure Digs Hole to Lay Pipe under Driveway



In order to lay a pipe from his basement to a hydrant in the lawn without tearing up part of the driveway alongside the house, one man utilized water pressure to dig the hole through the ground. The pipe was attached to a faucet with a length of garden hose as shown, and then inserted into a hole previously made in the basement wall. After turning on the water, the pipe was slowly pushed through the ground as the water washed the soil away.

Secret Electrical Hookup Opens Wall Safe



Only one who knows the right setting of the switches can open this wall safe. Unlike combination safes of the mechanical type, this one works by means of an electromagnet. When energized, it is lowered to pull the locking bar from its position in two rows of staples or screw eyes, one row attached to the door and the other to the wall of the safe. Three 8-point radio switches are fitted on the door and are wired in series so that a predetermined arrangement of the switch levers will close the circuit that energizes the electromagnet. You will notice that the electromagnet is suspended at the top directly over the large spike that is used as the locking bar, and that the magnet has a counterweight. A string attached to the counterweight comes out of the safe and this is pulled up to lower the magnet against the spike head. An electric bell or buzzer, cut in the circuit as indicated, will ring when the circuit is closed. If you desire to make use of the house-lighting current instead of dry cells, use a bell transformer to reduce the voltage.

Suction Pump Helps to Filter Chemical Solutions

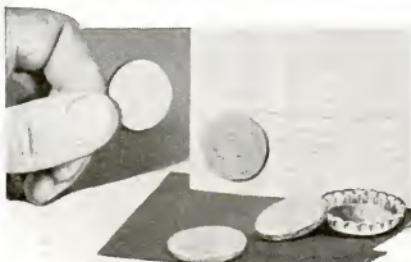
When filtering large quantities of water or chemical solutions, much time can be saved by using this suction pump, which is attached to a water faucet. Water rush-

ing through the pump creates a vacuum inside of the filtering container and causes the liquid to pass through the paper faster than it would ordinarily. The fitting used to attach the pump to the faucet can be obtained at a plumbing shop. With the pump connected, the faucet should be opened slowly, as too much suction will sometimes break the filtering paper.



Filtering of Liquids Is Speeded Up by Suction Pump, Which Creates Vacuum Inside of Container

Cork Feet on Jewelry Boxes Prevent Marring Polished Surfaces



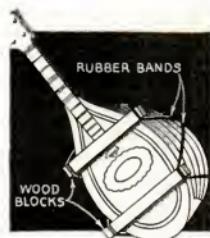
Cork Disks from Bottle Caps Glued to Decorative Boxes Prevent Them from Marring Furniture

Cork disks from bottle caps prevent jewel boxes, ash trays, vanity cases, etc., from scratching the surfaces of tables. The disks can be used whole, or they can be

cut into pieces and they are glued to the bottom of the box, one at each corner. Small disks cut from an old felt hat are also satisfactory for this purpose.

Rubber Clamps for Repairing Bowl-Shaped Mandolins

Two wood blocks and a couple of rubber bands provide good clamps for use when repairing a mandolin. The blocks are laid across the top of the instrument and the bands are slipped over the ends of the blocks and underneath the mandolin to hold the ribs.



What Do You Want to Make?



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The Secrets of making MARIIONETTES



By RUFUS ROSE

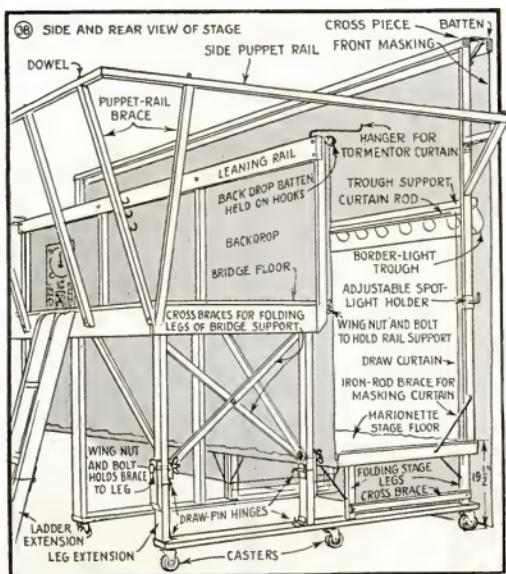
PART III

PROPERLY staged, a marionette show creates an amazing illusion of size in the minds of the audience. Instead of seeming their actual height, the marionettes appear to be of almost human size, an effect which is greatly increased because the scenery is also made to correspond. For the home a small stage is preferable, as shown in one of the illustrations. Although its size is comparatively small, the arrangement is practically the same as that of the folding stage shown in Figs. 38 to 41, which is an excellent design for high-school use. This stage was made collapsible so that it can be readily stored or transported. The original one, made in this way, could be folded to form trunks in which much of the paraphernalia could be packed. Each of the two end sections of the bridge has four folding legs hinged inside. The center bridge section rests on the ends of the legs, which fold out from two outside bridge sections. These legs are hinged to lie between outside legs when they are collapsed. Steel tongues, fastened to the edges of the legs where the center section rests, hold that section in place. The three stage-floor sections have four folding legs, used for the high set-up. All legs, runners, wood braces, ladder, and



Photos Courtesy A. & P.

Refer inquiries to Paul Sutton
612 Gary Place Sheass



the leaning rail, are made of light-weight pine while puppet rails, masking-frame rails, and rail supports are made of oak. All attachments of collapsible and removable parts are fastened by either draw-pin hinges or wing nuts and bolts.

Fig. 41 shows diagram of draw-curtain assembly. Provision is made for curtains to overlap each other at the center when closed. The front masking is sewed in one piece from closely woven material such as velour or rep. It is cut long enough to reach the platform floor when high set-up is used. The stage opening in the front masking is $7\frac{1}{2}$ ft. long, and extends from points 4 ft. above the marionette stage floor to the platform on which the equipment is set up. The space from the stage floor to the platform is masked by an additional piece which is sewed to the front edge of the stage-floor cloth. When the low set-up is used, both masking cloths are folded back at the platform level and held with snaps. The stage-floor cloth and tormentor curtains are made from a neutral-colored cotton velvet. The floor cloth is tied to the stage floor by tapes which are sewed to the cloth at four corners and at two points in the back edge. The tormentors are held in position by the tormentor

hangers which swing from each end of the leaning rail.

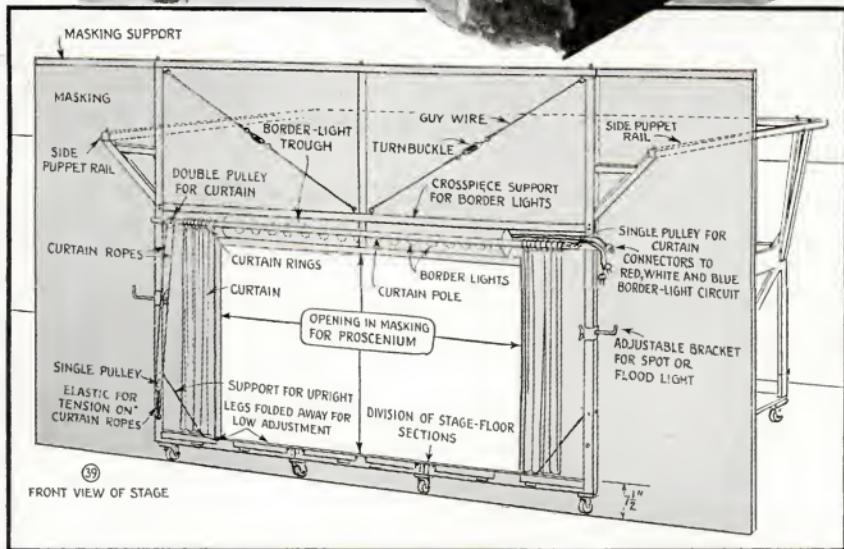
The installation of lighting equipment should be done in accordance with regulations governing such equipment. This equipment includes: a rheostat or dimmer; at least one baby spotlight and one small floodlight with removable color frames and gelatines; three 3-ft. border-light troughs; connectors, receptacles, and conduit. The border-light troughs are wired with three separate circuits for red, white, and blue lights. Use 60-watt bulbs. These fixtures are mounted on a panel which is attachable to the



back of the bridge for convenience of operation.

To be a good marionette operator or puppeteer you must first be interested in puppteering and enjoy it. Hold the controller as shown in photo Fig. 27, with the main control bar firmly in the left hand, grasping it midway between the head crossbar and the back end, so that your thumb can reach the clip that holds the foot bar, and with the fingers of the left

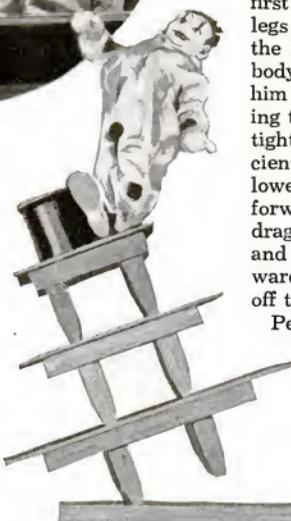
hand in position to tighten the shoulder strings, which run through the screw eye. Grasp the foot bar firmly in the center with your right hand. First, have the marionette stand correctly. His feet should rest on the floor and his body be erect. Feel the weight of the figure as it is distributed between the shoulder, head, and back strings. Now lower the front end of the controller, so that with the puppet's feet flat on the floor you feel all of its weight supported by the back string. To move the head to either side, tighten the





A. & P. Photo

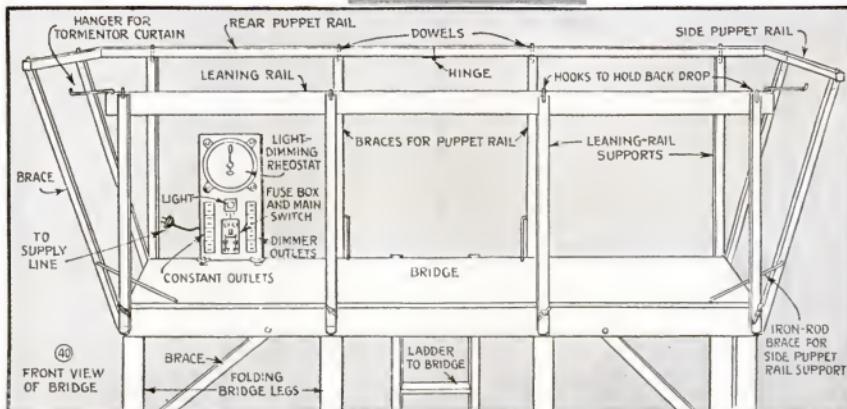
shoulder strings with fingers of your left hand and tilt the head bar to one side and then to the other. To move the hands, grasp the hand strings at a point about 8 in. below their attachment with your right hand, while holding the foot bar at the same time. Feel the weight of the hands and make smooth sweeping gestures, with first one and then the other. Avoid jerky motions. To make the marionette walk, bend him slightly forward,



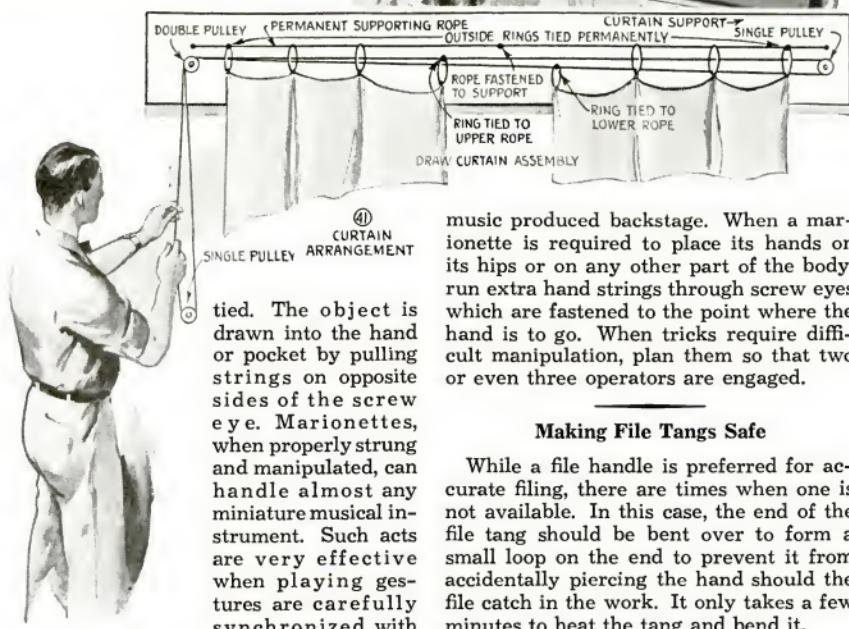
and practice his steps first by raising one end of the foot bar and dropping it, letting the foot slam down. Then raise the other end and drop it. When he can walk in place without getting his feet tangled, let him progress with his steps by a steady motion of the controller, always keeping the figure leaning slightly toward the direction in which he walks. The main controller should be raised and lowered slightly in even tempo with motion of the leg bar as the figure moves along in his rhythmic gait.

When making a marionette sit down, first bend him forward, bend his legs at the knees by tightening the knee strings, and lower his body into the chair. Then lean him back into position. In kneeling the figure to the right knee, tighten both knee strings sufficiently to start the knee bend, lower the figure and carry him forward, letting the right foot drag with a slack knee string, and pulling the left knee forward while the left foot is kept off the floor.

Perhaps the best way for marionettes to pick up objects is through regular manipulation of the hand string with a hook concealed on the inside of the hand. The object can be dropped at will by



resting it on a table and letting the hook fall free. A marionette can very effectively use a cane in either hand at will by having control strings anchored to either side of the cane knob and running through holes in each hand or through a screw eye in the controller. The cane will be held by either hand at will by pulling the string on one side or other of the screw eye. A similar arrangement can be used for making a marionette take a handkerchief or other object from its pocket and replace it, by having strings run from one side of the screw eye in the controller down through a screw eye fastened in the marionette's body, just below the bottom of the pocket, thence through the bottom of the pocket and out through the pocket opening to the handkerchief or other object to which it is tied. The other side of the string runs from the controller screw eye through a hole in the hand to the object to which it is tied.



tied. The object is drawn into the hand or pocket by pulling strings on opposite sides of the screw eye. Marionettes, when properly strung and manipulated, can handle almost any miniature musical instrument. Such acts are very effective when playing gestures are carefully synchronized with

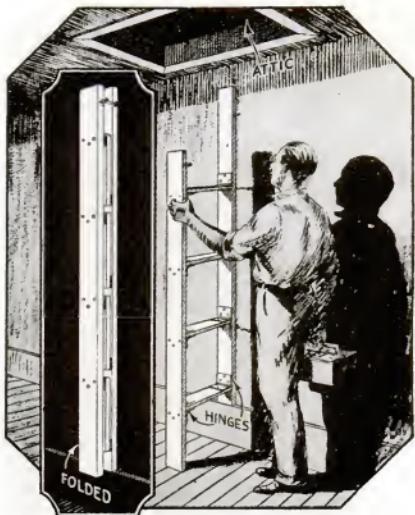
"Hod" Lewis Photo



music produced backstage. When a marionette is required to place its hands on its hips or on any other part of the body, run extra hand strings through screw eyes which are fastened to the point where the hand is to go. When tricks require difficult manipulation, plan them so that two or even three operators are engaged.

Making File Tangs Safe

While a file handle is preferred for accurate filing, there are times when one is not available. In this case, the end of the file tang should be bent over to form a small loop on the end to prevent it from accidentally piercing the hand should the file catch in the work. It only takes a few minutes to heat the tang and bend it.

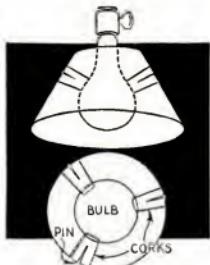


Ladder Fastened to Wall under Attic Trap Door Folds Up When Not in Use

Folding Ladder to Attic Is Fastened to Wall

In small homes and cottages where an attic stairway is not provided and entrance is made through a trap door in the ceiling of a closet or hallway, a folding ladder can be fastened permanently against the wall under the trap door as shown. When not in use, the ladder is folded against the wall and held with a hook, in which position it takes very little space.

Emergency Lamp Shade Made from Corks and Paper



The corks can be attached to the paper cone with pins.

An emergency shade for an electric lamp can be had by slipping a conical piece of heavy paper over the bulb and using three corks as shown to hold the shade away from the bulb and prevent the paper from being burned.

How to Simulate Antique Wear on Ship-Model Parts

When painting parts of a ship model that is to be antiqued, a priming coat of dull ivory or light brown is first applied, and is followed by finishing coats of Japan colors. When the latter have dried, the worn sections of the hull, rails, wales, etc., are imitated by rubbing these areas briskly with a soft cloth until the under color begins to show through. Trials on waste stock, painted as above, are first made as a guide before the process is used on the actual model.

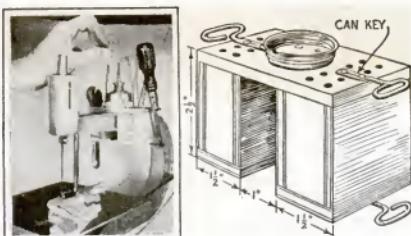
Ventilating a Room without a Draft

When you want to ventilate a room without a direct draft, take a 6-in. board the same length as the width of the window in the room, hinge it in the center and then slip it under the bottom of the lower sash. This allows air to pass between the sashes at the center of the window as indicated by the arrows in the drawing.—R. W. Schneider, Evanston, Ill.



Rack Holds Tools on Arm of Jig Saw

Accessories for a jig saw, such as extra blades, sanding sticks, screwdriver, etc., can be stored conveniently in a small rack mounted on the upper arm of the saw, as



Made of Plywood, This Rack Keeps Tools Required in Operating a Jig Saw within Easy Reach

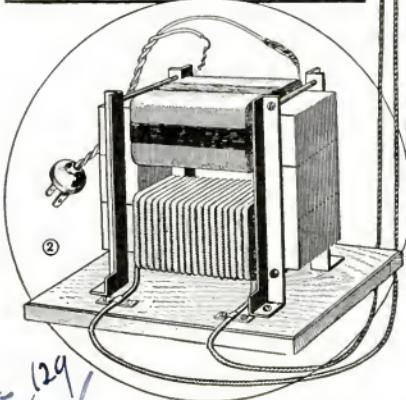
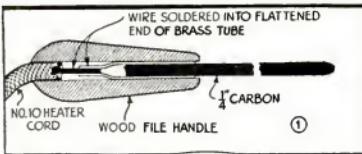
illustrated. A fruit-jar lid, tacked to the center of the unit as shown, will be convenient for holding an oil can.—Ray J. Marran, Kansas City, Mo.



Soldering with an ELECTRIC ARC

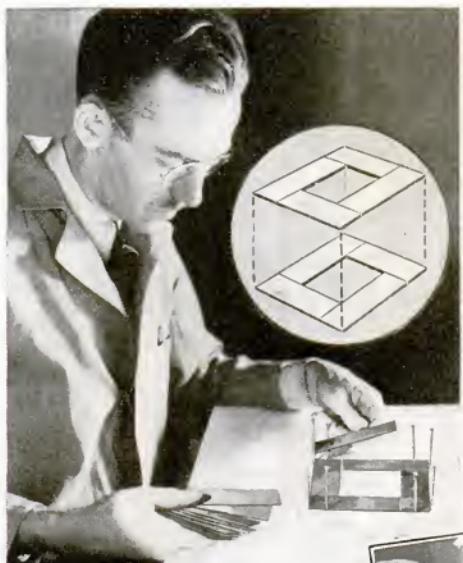
WITH carbon-arc soldering equipment, designed to operate on a 110-volt, 60-cycle, a.c. circuit, there is no need of waiting for the soldering iron to heat. The large clip is simply attached to the work and the solder and carbon touched to the spot to be soldered. The carbon electrode gives no heat except at the moment it is in contact with the work; therefore it is invaluable for soldering work where the heat of an ordinary iron would be destructive to surrounding parts.

The main unit of the soldering outfit is a transformer, Fig. 2, which should be built carefully. Its core is made from any convenient gauge of transformer grade silicon steel. No. 26 gauge is satisfactory. The steel is cut into pieces $1\frac{1}{4}$ in. wide and 4 in. long. A pile of pieces of this dimension $7\frac{1}{2}$ in. thick will be required for an outfit to operate on 60 cycle a.c. About 10 lbs. of this steel will be needed for 60-cycle current. If your current supply is 25 cycles you will need about 30 lbs. of

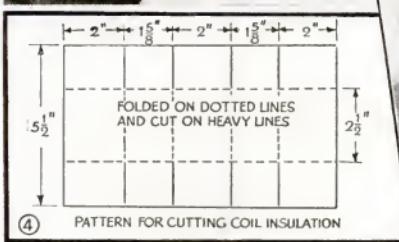


Steel Sales Corp., 129 W. Jefferson Chicago 621

*Auto-Power
408-0 Hoyne Ave
Chicago*

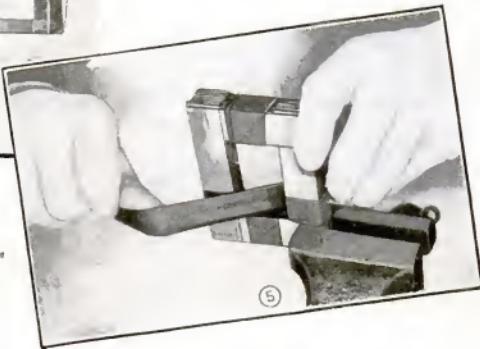


(3)



(4)

PATTERN FOR CUTTING COIL INSULATION



(5)

steel, and it should be cut into pieces 2 in. wide and 5 in. long. Fig. 3 shows a simple method of piling the pieces of steel, or laminations as they are called, to make the core. The detail shows the arrangement of adjacent layers. After the core has been stacked it is lifted from the jig, squeezed in a vise and taped tightly on three sides, Fig. 5. The fourth or untaped side is next temporarily removed piece by piece as in Fig. 6, so that the coils may be installed.

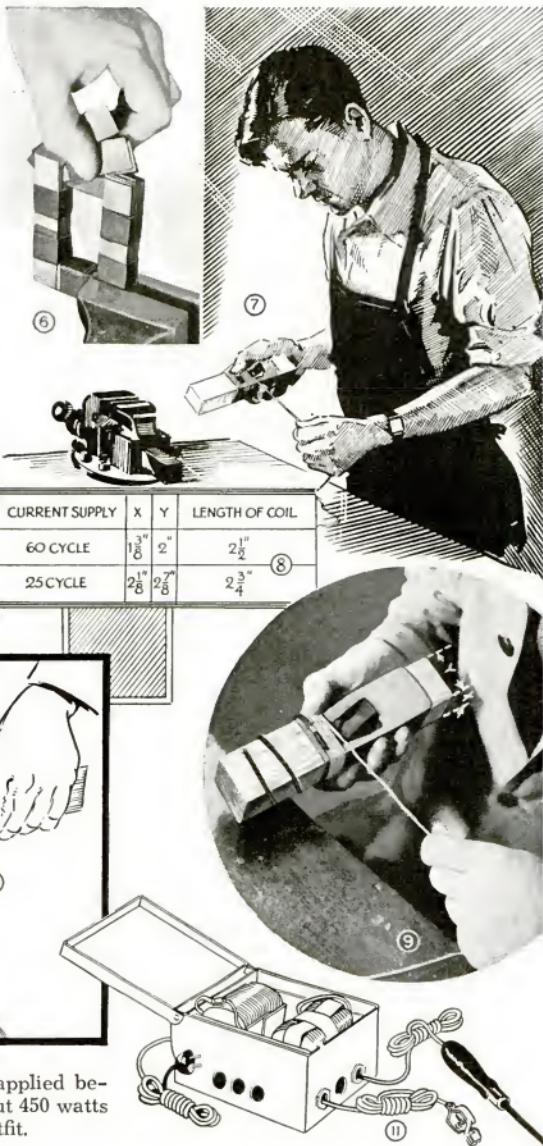
The coils are wound on a form as shown in Figs. 7 and 9. Fig. 8 gives dimensions for both 25 and 60-cycle outfits. Fig. 4 shows how to lay out and cut pieces of tough sheet fiber or flexible cardboard to be wrapped around the form before winding the coils. As the coils are completed

the insulating fiber is slipped off the form with them, and the extending ends are folded around the coil and taped in place. The primary consists of 250 turns of No. 12 double cotton-covered wire. The secondary coil, connected to the soldering electrodes, consists of 140 turns of No. 8 double cotton-covered wire. The number of turns of wire is the same for either 25 or 60 cycles. A 60-cycle transformer will require about 5 lbs. of No. 12 wire and about 8 1/2 lbs. of No. 8 wire. The 25-cycle outfit will require approximately 7 1/2 lbs. of No. 12 wire and 12 1/2 lbs. of No. 8 wire. After the coils have been completed they should be immersed in orange shellac and allowed to absorb as much as they will.

They are then allowed to drain and dry for several hours. The coils are next slipped on to the legs of the core and the removed pieces of the core are replaced and tapped down as in Fig. 10, after which they are bound with tape.

Details for the carbon holder are shown in Fig. 1. The file handle is drilled to a diameter slightly greater than the carbon to be used and lined with a copper or brass sleeve which makes good contact with the carbon and allows for easy change of carbons as they burn away in use. A large heavy-duty battery clip makes an ideal ground clamp. The completed outfit may be mounted above the bench either exposed or inside a large conduit box, Fig. 11, as best suits shop convenience. Another plan is to mount the outfit in a large electrical switch box fitted

with a handle so that the unit may be carried around for portable use. If the outfit is installed in a conduit box, the latter should be large so that there will be a clearance of several inches between the transformer and the box on all sides, top and bottom. To use the outfit, simply attach the ground clip to the metal to be soldered, plug the transformer into a convenient outlet and touch the carbon to the point to be soldered. The carbon will quickly become red hot. Cored solder is then applied to the spot and the carbon pulled away to form a hot flaming arc which will melt and flow the solder. The carbon may be moved along the seam to be soldered followed closely with the solder which will melt and flow into place. Plain



solder may be used if flux is applied before applying the carbon. About 450 watts are required to operate the outfit.

A Weather-Resisting Lubricant

Open gearing such as is found on cranes and similar machines requires a lubricant with good adhering qualities. Equal parts of soft white lead and plumbago, together

with cup grease, will be found satisfactory. The viscosity of the lubricant should be varied according to the temperature. If the mix is made up in the proportions of lead, 3 oz., and plumbago, 3 oz., to grease, 1 qt., it will be found about right.



Guard in Front of Open Elevator Shaft Automatically Raised as Elevator Ascends

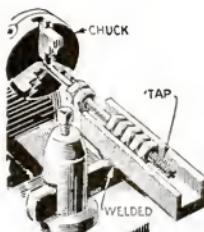
Automatic Guard for Open Elevator Shaft

A length of sash cord or small rope attached to the bottom of this elevator and to the safety guard below, lifts the latter into place as the elevator ascends, and lowers it over the pit as the elevator comes down. This arrangement permits the elevator to come flush with the runway to facilitate loading trucks.—Jos. C. Coyle, Los Angeles, Calif.

Holder for Re-Tapping Nuts in a Lathe

When nuts are plated or put through a rust-proofing process, the threaded portions on the inside are usually enlarged

so that they cannot be screwed onto bolts and must be re-tapped, which can be done easily in a lathe by using this holder and a tap with a long shank. The holder consists of a rectangular piece of steel, which is slotted to form a trough slightly wider than the distance across the flats on the

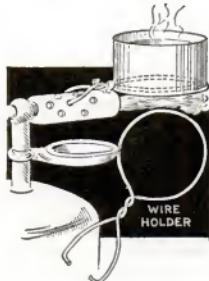


slotted to form a trough slightly wider than the distance across the flats on the

nuts, and welded to a piece of steel to fit in the lathe tool post. In use, the tap is held in the lathe chuck with the threaded end projecting about 2 in. into the trough. When a nut is dropped into the trough and pressed against the tap, it will run up the threaded part onto the shank. As soon as the nut has traveled far enough for the end of the tap to project through it, another nut is started.

Heating Water with a Blowtorch

Plumbers, tinsmiths and electricians who occasionally need small quantities of hot water or other liquids will find it conveniently with a blowtorch. Make a small wire bracket or holder similar to the one illustrated and use it to hold a small can in the torch flame as indicated.



Magnifying Glass on Flashlight Is Handy for Inspecting Work

Often work must be inspected with a magnifying glass in dark, restricted places where the only illumination is a flashlight. This is rather unhandy as both hands are occupied with the glass and light. To eliminate this trouble and have one hand free



Magnifying Glass Attached to Flashlight Leaves One Hand Free When Inspecting Work in Dark Places

to manipulate the work, fasten the glass to the end of the flashlight with a rubber band as shown.

Labor-Saving Uses for Parallel, Pivoted Links

Many practical applications can be found for parallel, pivoted links. One use is the hoist shown in Fig. 1. A square frame



FIG. 1



made up of sturdy steel bars pivoted together, is provided with a threaded crank, which runs in two tapped bushings as indicated. The threaded sections of the crank must be right and left so that when the crank is turned the bushings will travel in opposite directions. It is also necessary to turn down the unthreaded portions on both ends, before bending the shaft to form the crank, to enable the bushings to be slipped in place. In use, the action of turning the crank, to drive the bushings apart, will raise the lower end of the hoist, which is provided with a suitable hook. Powerful lifting force is exerted although the lifting distance is rather limited. With slight alteration, the hoist may be used to exert a pressure instead of a pull, and will therefore make an excellent trench brace, Fig. 4. In Fig. 2, parallel links are used to make a work support on a circular saw. One bar is fastened to the saw table and the movable portion is anchored to a coil spring, the tension of which determines

the pressure exerted against the work. When it is necessary to keep a drum of liquid at certain height above the floor, the task of lifting it, to set it on a support, can be made easier by pivoting four angle-iron legs to the floor and to two cross-pieces made to hold the drum. This arrangement permits the top of the stand to be brought down against the floor, as indicated by the arrows, so that the drum can be rolled on the crosspieces, after which both drum and rack are pushed up. As will be seen from the dotted lines, less lifting movement is required than is necessary when hoisting the drum up on a stationary stand as only part of the movement is vertical, after which a pushing action raises the drum and rack in place. The rack should be leaned against the wall at a sufficient angle to keep it there without danger of tipping.

Oil on a new file should be removed before using it on metal.



PROTECTING the BOAT against



WINTER is hard on most boats, but a few precautions taken when the boat is put up will save much work and expense when putting it back in shape again. Boats stored in the open should be covered with canvas or tar paper. A common mistake is that of laying the covering material directly on the boat. This is better than nothing, but a frame to hold the cover from the boat will keep the cover from freezing to and damaging the painted or varnished surfaces. Inside of the boat all drains should be opened. If the boat is

so stored that there is no drain hole, at the lowest part of the hull bore a 1-in. hole. A plug can be fitted into this hole in the spring. Take up all floor boards and remove all waste, rags, paper and other matter that has found its way into the bilge. Then rinse out the bilge to remove most of the dirt. After this, scrub out the bilge with hot water and any good cleaning powder or soap and rinse thoroughly. Be sure that all limber holes (drain holes on the planking side of ribs near keel) are open and that all water drains from the bilge. If it does not, sponge the

bilge dry and then be sure that no rain can enter the boat.

After the bilge has had a couple of weeks in which to dry it should be painted unless the paint is in good condition. At this time the bottom should be rubbed down with steel wool and given a coat of special bottom paint. After this single coat, all seams should be inspected and any that are open should be caulked. Then a second and final coat of bottom paint should be applied. This will retain about the right amount of moisture in the planking and



Bent edges of propellers should be hammered into place and missing metal built up by welding



WINTER

prevent excessive opening of the seams. Refinishing of sides, top, and interior should be left until spring in order that the boat will be as fresh as possible for the summer. The keel of any boat should be firmly blocked at all times, a support every 10 ft. being sufficient. The important thing to watch is the tightness of the blocks. The blocks should be stout pieces of wood wedged into place and checked every few weeks during the storage period to be sure that softening of the ground has not permitted them to loosen. Many a boat has lost speed as a result of careless storing which has permitted the keel to go out of shape. Proper shoring—as blocking up the boat is called—will prevent this. In addition to the keel blocks there should be two braces on each side.

If considerable mechanical work is needed on the engine it is best to remove the whole unit and take it to a place where warmth, room and light are available. If overhauling is not needed slight adjustments can be made right in the boat. But be sure that the engine is drained. Check it all over for water-jacket drains. Some have water-jacketed reverse gears which must be drained if damage is to be avoided.



After a thorough rub-down with steel wool the bottom of the hull is painted



Above: Groove in shaft, caused by electrolysis, may be built up by welding and then ground to size
Right: Blocking adjusted by wedges keeps the keel true all winter



ed. It is also a good plan to drain off the old engine oil at the close of the season, refill with new oil and run long enough to thoroughly distribute the oil. Then take out all spark plugs, pour $\frac{1}{4}$ pt. of oil into each cylinder and screw the plugs in place loosely. Then during the winter, give the engine a turn or two every month. The storage battery should be removed and thoroughly charged, and every month or



Left, a liberal application of oil on top of the pistons prevents rust inside the motor. Above, light wood frame holds tarpaulin off the upper surfaces of the boat

condition by welding. Neglecting damaged propeller shafts has sent many a valuable propeller wheel to the bottom. Most boats in fresh water have steel shafts running through a bronze bearing or packing box. This results in an electro-chemical action which consumes the steel shaft. The corrosive effect is generally concentrated at the point where the shaft emerges from the stuffing box. The cheapest way to correct this trouble is to remove the shaft and have the groove filled with steel after which the repaired section is ground to size.

six weeks given a freshening charge to keep its specific gravity up around 1.280, or to the full charge mark on the hydrometer.

All ropes should be removed and stored in a dry place, but even with the best of care, ropes lose strength from year to year and need replacement. Removable instruments and equipment should also be taken to a place where they may be securely locked. Polished metal surfaces should be coated with vaseline to prevent corrosion. Many boat owners take advantage of the winter months to have their polished brass chromium plated to improve the appearance of the boat and to reduce the work of keeping things shipshape. Most damaged propellers can be repaired. On cruisers and slow boats, this work does not require quite the precision that is necessary on propellers that turn up at extreme speeds. Most damage consists of either bending the blades or tearing them on rocks. It is best to have this work done at a regular marine shop. However, many a damaged propeller has been put into good

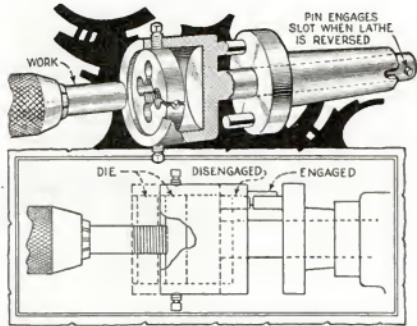
Holes in Shovel Aid in Handling Wet Mixtures

When shoveling mud as in ditching, river work, cofferdams, etc., and some of the water in the shovel drips back on the user, which is likely if the swing is the least bit cramped, much of this trouble can be eliminated by drilling a number of $\frac{1}{2}$ -in. holes in the shovel as shown. This allows the water to escape just as the shovel is lifted and before the swing is made. The shovel may still be used for other purposes as the holes are too small to allow dry earth or gravel to pass.



Threads Cut with Dies on Lathe

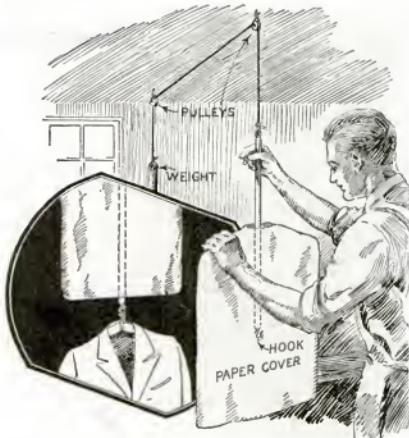
Threading the ends of small rods with a round die may be done accurately in the lathe by using a die holder, which releases automatically when the thread has been cut to the required length. The holder is turned from round stock and is recessed to take the die, which is held in place with two set screws as shown. The short spindle on the holder revolves in a tapered shank and is fitted with a transverse pin which engages a slot in the rear end of the shank. The latter is flanged as shown, and the taper fits the tailstock quill. Two pins set on the same radius, one in the holder and one in the shank, engage when the die starts cutting. As the thread progresses the holder moves outward from the flange until the pins disengage. This releases the die holder which then turns free with the work. When the lathe is reversed to back the die off, the cross pin in the end of the holder spindle engages the slot in the shank and holds the die stationary while it is backed off the thread.—Geo. A. Luers, Washington, D. C.



Simple Jig Enables You to Cut Threads with Round Dies in Lathe

Simple Arrangement Saves Time in Dry-Cleaning Shop

Here is an arrangement that aids in slipping paper covers over cleaned garments in a dry-cleaning shop. A sash cord, running over two pulleys fastened to the shop ceiling, has a weight tied to one end and a broomstick or dowel rod to the other. In use, the stick is pulled down through the opening in the top of the cover, which is then secured to a brad in the upper end

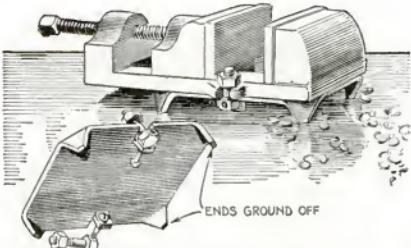


Cord-and-Pulley Arrangement That Aids in Putting Paper Covers over Garments in Cleaning Shop

of the stick. When the stick is released the weight raises the cover. The garment is then hung on a screw hook in the lower end of the stick and the cover is pulled down over it. The weight should be sufficient to hold large, heavy garments off the floor.—Martin G. Winterton, Ft. Lewis, Washington.

Feet Improve Drill-Press Vise

To prevent metal cuttings from interfering with movement of a vise on a drill press, I fitted the vise with feet, which raised it slightly above the top surface of the table. A steel plate was first squared and then the corners were bent down and ground off so that the vise would rest perfectly level on the table. The method of attaching the feet to the vise is shown in the drawing.—H. Moore, Hamilton, Ont.



Feet on Drill-Press Vise Prevent Metal Cuttings from Interfering with Use of Vise on Table



Heavy Paper Placed between Layers of Stacked Package Goods Keeps Them from Falling Off

Paper Makes Stacks of Cans and Packages More Rigid

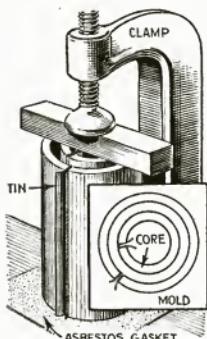
Grocers who arrange their canned and package goods in neat stacks will find that a sheet of paper placed between each layer, as the stack is built up, will help prevent the packages from falling away from the stack. The paper is especially handy when tall stacks are put on the floor or in a show window.

Casting Babbitt Bushings with Molds Made of Pipe

For casting babbitt bushings of odd size, the problem of getting suitable molds is

quickly solved by using short sections of pipe or tubing of the required size. Each pipe is squared at one end and is split lengthwise with a hack saw. Pieces of tin or sheet asbestos are then folded and inserted in the cuts, after which the edges are folded back to seal the opening. When the

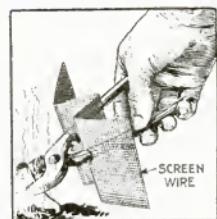
mold is set on an asbestos gasket, and held in this position securely with a C-clamp,



the molten babbitt is poured between the pipe forms, and can be driven out easily after it has hardened. The molds should be preheated to about 250° F. before pouring the babbitt to evaporate all moisture and to prevent the metal from chilling before it fills the mold properly.—O. D. Carter, Fresno, Calif.

Screen-Wire Shield Protects Hands When Carrying Hot Ladles

An emergency shield to protect the hands when carrying ladles of molten metal with a pair of tongs or pliers can be had by slipping a piece of screen wire over the handles. After punching holes through the screen, it is folded as shown, and slipped over the tong handles.



Suitcase Serves as Portable Desk for Traveling Business Man

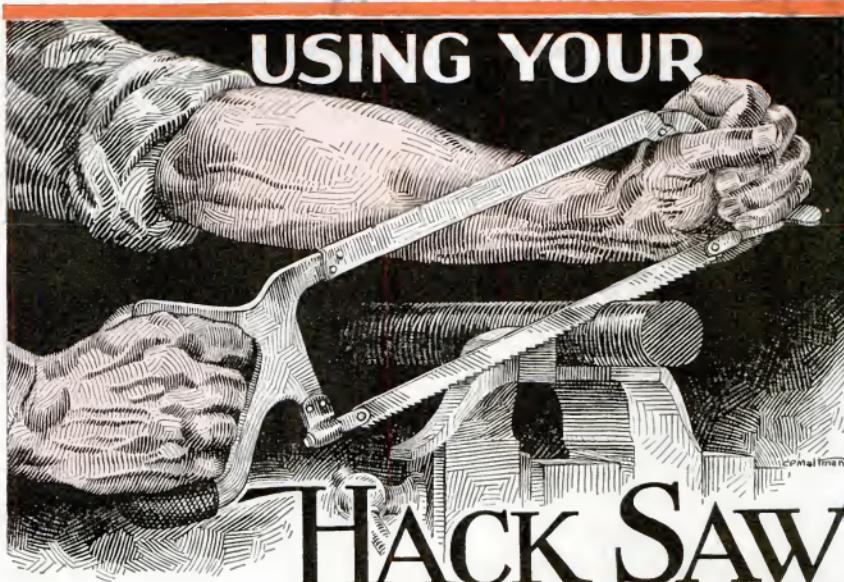
For the business man who travels, a suitcase divided into pigeonholes with pieces of corrugated cardboard or thin plywood, is convenient. With this arrangement, an office can be set up temporarily



Suitcase Divided into Pigeonholes Serves as a Portable Desk and Filing Cabinet

right inside of your car as shown. The suitcase used for this purpose should be strong and should be made of stiff material.

► Brighten old pen points by dipping them in ammonia and rubbing with cloth.



USING YOUR HACK SAW

By W. CLYDE LAMMEY

WHETHER it is used to cut small metal rods, pieces of flat stock, to slot the head of an improvised screw, or even to cut a keyway in a piece of shafting, the hack saw is one of the most useful tools in the workshop. Four types of hand hack saws are shown in Fig. 4. For general use, you will find the kind having a pistol grip most convenient as it permits one to hold the tool correctly. Most hack saws are adjustable so that blades of different lengths can be accommodated. You will find a medium-tooth blade, 12 in. long, the best for most purposes.

In simple cutting-off operations on solid stock, first measure and mark the work for length; then before attempting to start the blade on the line, take a small three-cornered file and notch the surface on the line to a depth of about $\frac{1}{16}$ in., as in Fig. 6. Be sure that the notch is square with the work, then set the blade in the notch as in Fig. 7, and take a light forward stroke, the left hand grasping the forward end of the saw frame in the manner shown in the illustrations. The left hand should always



apply the greater pressure and at no time should this be excessive. Heavy pressure not only causes the blade to heat up rapidly, but loads the teeth with an excess of metal which invariably causes binding and breaking of blades. There is a tendency, even among many practical mechanics, to exert too much pressure with the right hand when cutting metal with a hack saw. This tends to force the rear end of the frame downward with every forward



stroke, and at the same time springs the blade, which results in chipped teeth. The blade will cut much faster under uniform light pressure, will leave a smooth surface, and it is far easier to control the direction of the cut when following a line. Just before the cut comes through on solid stock, lower the forward end of the saw frame a trifle as each stroke is made to prevent the saw teeth catching in the thin metal and breaking out at the gullet or space between the teeth.

Tubing having a wall $\frac{1}{8}$ in. thick or more can be cut easily with a hack saw by

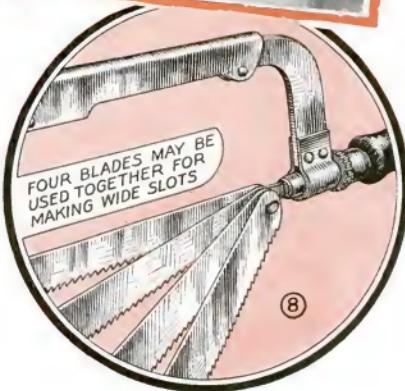
first scoring a guide line around the surface, filing a notch to start the blade and, after the cut comes through the wall, gradually dropping the handle of the saw as the cutting progresses, so that the cutting is done only on one wall. The tubing is turned in the vise until the cuts meet. Thin-walled tubing should be supported at the cutting point by plugging it with a close-fitting cylinder of hardwood. When this is done you can cut straight through both walls. Likewise, small pieces of thin sheet metal can be cut to size by clamping them between two blocks of wood, the size of the finished piece being laid out on one block. When cutting thin sheet stock, it is very difficult to follow guide lines if the blade is run at right angles to the work. This is often necessary due to the size of the material but should be avoided whenever possible and the saw run at an angle in the same manner as a handsaw when cutting through wood.

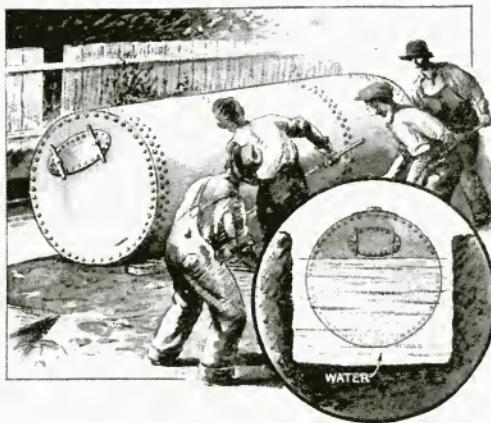
You can often save time by having an assortment of blades at hand, any of which can be slipped quickly into the hack-saw frame, Fig. 5. They come in a variety of thicknesses and degree of temper to suit varying conditions and type of work. The life of a hack-saw blade, its cutting speed, and the quality of work it does, depend entirely upon the manner of handling the tool, the material being cut, and the pitch of the teeth. For best results use a blade with 14 teeth per inch for cutting iron or steel rods and bars, and one of 20 teeth per inch for cutting pipe of any size, tubing or brass rods. A blade with 24 teeth



per inch is best for very light, thin-walled tubing and the softer metals generally, while a blade with 32 teeth per inch will perform best in cutting thin sheet stock in steel, brass or softer material. The standard blade is tempered all hard and is usually .025 in. thick. Certain types of work require a more flexible blade than the all-hard temper. These blades have hardened teeth and back with a soft center to withstand severe twists and side strains without breaking. Special short blades, 8 in. long, with fine, specially set teeth and thicknesses varying from .016 to .050 in. are available for use in fine work requiring accuracy and smooth finish. The model maker can make use of these blades on many operations in metal. Very fine coping-saw blades for cutting metal are also available.

The ordinary hack-saw blade can be used for slotting and channeling on flat work by clamping two equal-sized strips of hardwood to the blade as shown in Fig. 2. These give the blade the necessary rigidity and at the same time act as an accurate depth stop. By cutting a series of parallel slots, removing the waste and finishing with a file, one can form a channel or groove that compares favorably with machine work. Screw heads may be slotted as in Fig. 3 and several blades held side by side as in Fig. 8, to cut a wide slot. Many small shops will find a bench hack saw as shown in Fig. 1, a very useful tool. It permits accurate work when cutting off stock square or at an angle, and over a period of time will save considerable in blade breakage alone. The work is held in a vise which can be set at any angle from 45 to 90°.



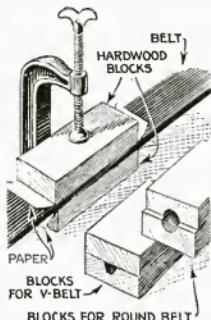


Heavy Storage Tank Lowered into Hole by Filling Excavation with Water and Then Pumping It Out

Storage Tank Lowered into Hole with Aid of Water

On a construction job we had a large storage tank to bury underground in a certain position. As there were no supports or falls at hand with which to lower the tank into the excavation, we filled the latter with water and rolled the tank into it. It was then an easy matter to maneuver the tank into position and pump out the water so that it would settle to the bottom of the hole.—Earl Pagett, Coffeyville, Kans.

Splicing Leather Belts

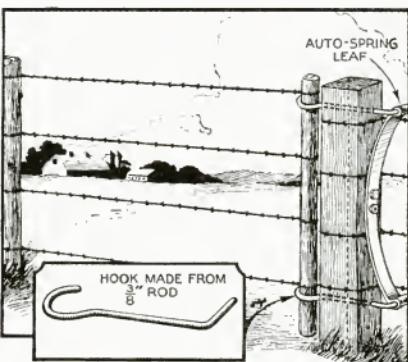


Leather belts work best and with the least noise when the ends of the splices are beveled and cemented together. A good adhesive for this purpose is made by dissolving high-grade cabinet-makers' glue, 1 part, in water, 4 parts, taking care not to overheat the glue. In a separate container, dissolve tannic acid, 1 part, in water, 10 parts. A few drops of glycerine will help to dissolve the acid. This solution is heat-

ed and is added to the glue, after which the combined mixtures are heated in a glue pot until they are stringy. To prepare the splice for the adhesive, first bevel the ends of the belt and then roughen the inside surfaces of the beveled part. The prepared belt ends should be warmed slightly before applying the adhesive. Immediately after applying the adhesive, place the splice between blocks of wood as shown, with sheets of paper between the wood and the leather to prevent sticking, and apply pressure with a clamp. The cemented splice should be left clamped for a couple of days to assure a permanent job. When dry, the paper should be removed. Round and V-belts may be spliced in the same way by using grooved clamping blocks as shown in the lower detail.

Auto-Spring Leaf Keeps Wire Gate Taut When Closed

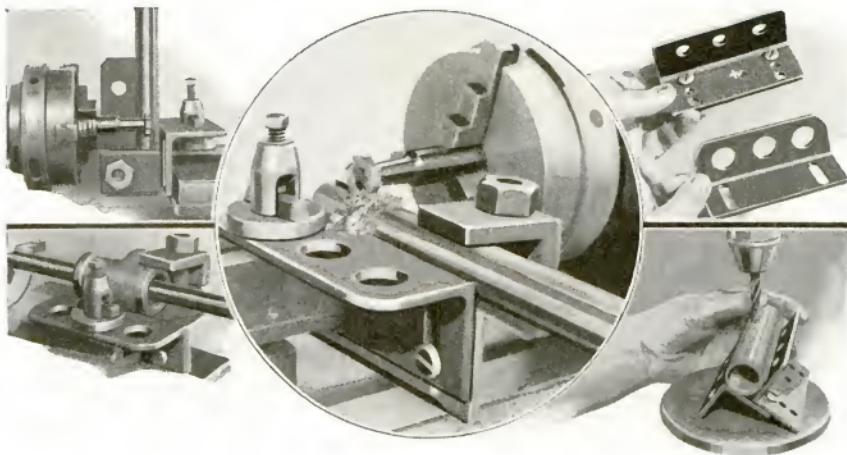
A barbed-wire gate can be kept taut by bolting the bottom leaf of an auto spring to the post holding the unattached end. Holes are drilled through the post in line



Old Auto Spring Bolted to Fence Post Takes Up Slack in Wire Gate

with the eyes of the spring, and a rod having one end bent to a hook is slipped through each hole, after which the other end is bent at right angles to engage the eye of the spring.

Jig to Hold Work in Lathe for Milling Cuts



With this simple jig to be held on the lathe carriage, you can cut either straight or Woodruff keyways, besides many other jobs of grooving, facing and rabbeting. The jig is made of two pieces of $1\frac{1}{2}$ -in. angle iron, $3\frac{3}{4}$ in. long for use on a slide rest measuring 3 in. across the T-slot. The hole marked with a cross, in the upper right photo, must be located so that the clamp bolts will fit snugly in the slot of the other member, when the jig is arranged to support work in a vertical position. All holes should be reasonably snug fits and it is advisable to dress up the flat faces of the angle iron with a file so that they will draw firmly together. A "dog" for clamping work to the plate is made from a piece of $\frac{1}{4}$ by 1-in. stock with a $\frac{5}{8}$ -in. right-angle bend at one end. In use, for cutting a straight keyway, the jig is set up as in the center detail, being clamped under the toolpost ring, without the rocker. The work should be drawn into the cutter—not pushed against it. Shims of desired thickness are used to elevate the work for making successive cuts. The cutter should be kept wet with lard oil or other cutting compound such as a mixture of equal parts of lard oil and turpentine. It is best to run the lathe at about 100 r.p.m. Cuts for a Woodruff key are taken as shown in the upper left photo, the work being arranged vertically. With this ar-

rangement the jig is supported with the toolpost through the center hole. To bore out a fitting that is rather difficult to chuck in the lathe, the jig is arranged as shown in the lower left photo, again with the toolpost through the center hole. The boring bar is mounted between centers and is driven with a dog. Shims are needed to center the work. The jig will also serve the purpose of a V-block to hold round work for drilling, scribing and center-punching as in the lower right photo.—R. G. Bullard, Monterey, Park, Calif.

Wire Used as Substitute Clamps for Radiator Hose

When using wire as a substitute for radiator hose clamps on a car, shape it as shown and it will be easier to get a tight joint without breaking the wire. After twisting the loose ends together, use a nail and twist the small rings until the joint is tight. Care must be taken not to tighten the clamp too much as it will then cut the hose.—Joseph Gibbons, Albia, Ia.



How to SERVICE



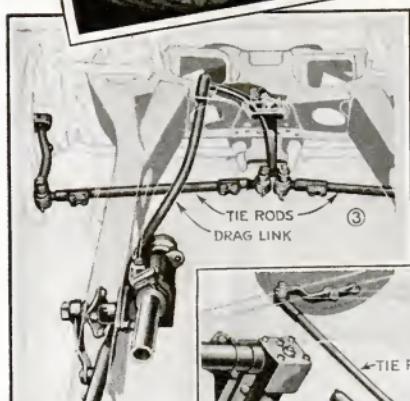
Knee-action wheels typical of Buick, Cadillac, LaSalle, Oldsmobile, Dodge, Plymouth and Chrysler 6

By JIM WARD

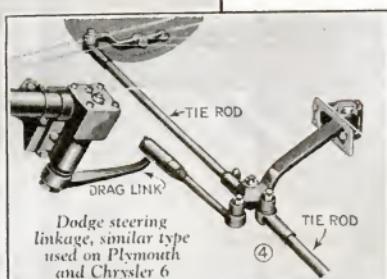
WHILE the average car owner is not equipped to service independently sprung, or knee-action wheels on his car, he can make a few minor tests and adjustments and keep the bearings of the suspension mechanism well lubricated. Lubrication is important as any undue wear in the bearings may get the front wheels out of alignment, which is dangerous when traveling at high speeds. For this reason, it is advisable to inspect the mechanism at intervals, and, if any wear or looseness is noticed, have your service man remedy it immediately. If this is neglected, it may soon lead to a large repair bill. Proper adjustment and lubrication of knee-action units cannot be over-emphasized, as they must be kept in first-class condition to get the benefits intended by the manufacturer.

Fig. 1 shows the wheel suspension used on Oldsmobile. A somewhat similar type is used on Buick, Cadillac, LaSalle, Dodge, Plymouth and Chrysler 6. With this type,

the wheel spindles and knuckles resemble those used with the conventional axle, and are pivoted indirectly to the car frame by means of arms. Pontiac and Chevrolet have a different kind of suspension as shown in Fig. 7. It is an inclosed unit having a heavy coil spring which operates in oil, and the entire assembly turns with the wheel.

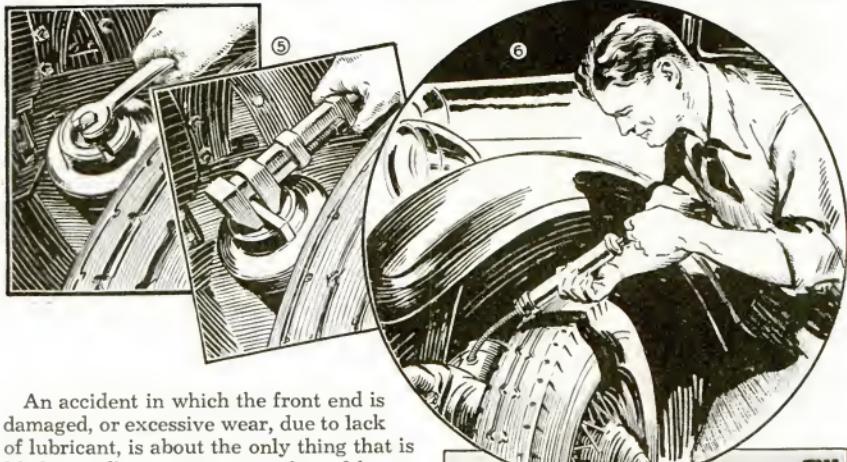


Steering Linkage used on Buick, similar type on LaSalle, Cadillac and Oldsmobile



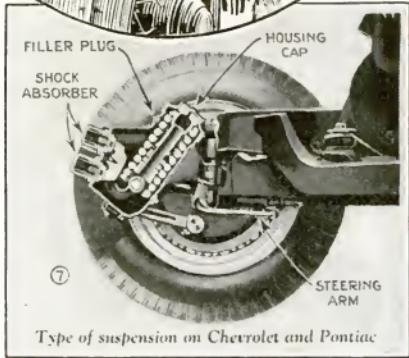
Dodge steering linkage, similar type used on Plymouth and Chrysler 6

KNEE-ACTION WHEELS



An accident in which the front end is damaged, or excessive wear, due to lack of lubricant, is about the only thing that is likely to affect caster or camber of knee-action wheels. Caster is adjusted on cars mentioned in Fig. 1 by turning the upper arm-control bolt as indicated, while camber is taken care of by adding thin shims at the points indicated in Figs. 8 and 9. Toe-in is, of course, adjusted by turning the tie rods in or out of the clevises at their ends in the same manner as is done on conventional steering gears. See Figs. 3 and 4.

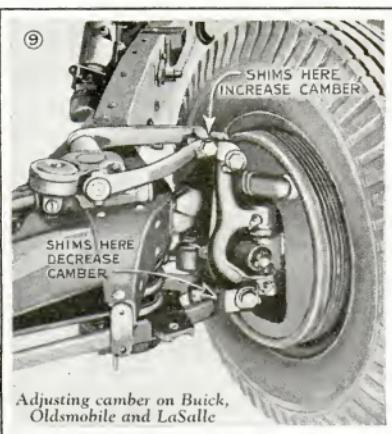
The suspension assemblies used on Chevrolet and Pontiac are serviced as complete units. About the only thing the owner has to do is to see that the housings are kept filled with the proper kind of oil. The inspection and filler plug is located at the top forward side of each housing. A grease gun, Fig. 6, with a flexible hose, is handy for putting the oil in the housings. If one front spring on a Chevrolet or Pontiac sags slightly, it can be raised as shown in Fig. 5. To do this, remove the cap screw in the head of the housing, lift the lock arm, drop an axle key or a similar piece of steel in its place, and turn the head down a little with a wrench. After any major work has been done on the units, have the caster, camber and toe-in checked; also the wheels for balance. The tires have round and square balance marks. When checking, always put the square mark at the



Type of suspension on Chevrolet and Pontiac

front, and put a tire on a wheel with the valve stem in line with the balance mark. Small weights, Fig. 2, which are attached to the rims, are used to balance the wheels. Correctly balanced wheels are important if the car is driven at high speeds as unbalanced wheels will cause excessive vibration known as "tramping."

The softness of the ride provided by knee-action wheels puts an added load on shock absorbers and makes their action more vital than it was with older cars. See that they are kept filled to the level of the filler plug with a special low-viscosity fluid. Be sure to use the fluids specified by the manufacturer as they are specially



treated to resist temperature changes as much as possible. Due to the soft front springs on cars with knee-action wheels, the rear shock absorbers must be kept correctly adjusted to prevent the rear part of the car from pitching when driving over rough roads. For this reason, it is important that the shock absorbers be checked at intervals. On some cars, they are located in such a position that it is almost impossible to fill them with any kind of an oil can. For this type, a hydrometer such as is used in testing batteries and radiators, will be found handy for putting in the oil. Before unscrewing the filler plug from the shock absorber, remove all the dirt with a wire brush. A

small particle of sand under a valve will make a shock absorber ineffective.

Because of the soft front springs on knee-action cars, proper brake adjustment is important as the application of brakes always throws the center of gravity of a car forward. The brake ratio on the front and rear wheels varies in different cars, which makes it advisable to have them accurately checked on a brake-testing machine at your service station.

Improved Method of Illuminating Free-Air Stand

A filling-station owner in Iowa has a method of illuminating his free-air stand that has been found a great improvement over the usual method of using a flood-lamp mounted on a standard above the stand. He has four lamps of low wattage mounted on standards located so that both sides of a car are fully illuminated. One lamp is left lighted at all times and a switch is mounted on the stand to automatically turn on the other three lamps when the air hose is removed from its holder, or in the case of a counterweighted stand, the switch is turned on when the pivoted half of the stand is pulled down. The fourth lamp is independently controlled so that it can be turned on at night to show the location of the stand. This method gives customers better illumination, yet takes less current than one strong lamp that is left turned on all night.

Lock Washers Prevent Sticky Valves

The use of several lock washers proved to be an effective remedy for sticky valves when all other methods failed. The valves were first removed from the motor and the stems and guides were thoroughly cleaned, after which a lock washer $\frac{1}{16}$ in. larger than the valve stem was slipped over each one. The valves were then replaced, leaving the washer between the valve head and guide. The action of the valve stems sliding through the washers kept the stems free of carbon deposits.—Vernon Harrison, Eaton, Ind.

Tool Box on Two-Wheeled Cart

Utilizing the chassis of a child's coaster wagon, one auto mechanic made a two-wheeled cart for his heavy tool box. This saved many steps as he could easily move the box around the shop or take it outside when making minor adjustments or repairs on a car at the curb. A large wood block was fastened to the chassis and a caster was substituted for the front axle and wheels as shown.—Paul Hugon, Los Angeles, Calif.



The "Live" Side of the Generator Cutout Is a Readily Accessible Place to Attach a Trouble Light

attach it to the ammeter. The live side of the cutout is the one to which is attached the wire that leads to the ammeter. A couple of battery clips soldered to the leads of the trouble light provide a quick means of attachment.—Fred J. Wensley, Nakusp, B. C., Canada.



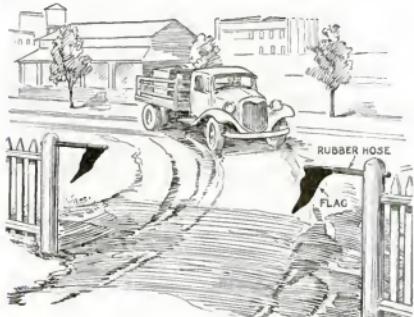
Child's Coaster Wagon Made into Cart for Auto Mechanic's Tool Box

Trouble Light Connected to "Live" Side of Generator

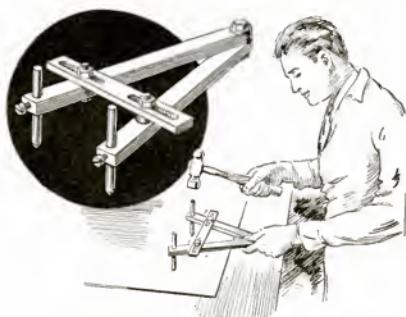
It is much easier to connect one lead of your trouble light to the live side of the generator cutout and ground the other lead to the motor than to remove the floor boards and connect the lead to the battery or reach under the instrument panel and

Warning Flags Aid Drivers to Steer Trucks through Gateways

To aid drivers in steering large trucks through a narrow gateway, a factory foreman had holes drilled through the gate posts near the top to take lengths of stiff garden hose, which carried small warning flags. If the drivers steered the trucks a little too close to one side, no damage was caused to the flexible flag supports.



Trucks Driven through Narrow Gateways with Aid of Flags Fastened to Posts with Rubber Hose

An Adjustable Spacing Center Punch

With This Device, Equally Spaced Holes Can Be Center-Punched in Work

When it is necessary to punch a number of equally spaced holes in long pieces of sheet metal, the device shown will be found highly satisfactory. It consists of two center punches and two short steel

bars, which are pivoted together at one end. Holes are drilled in the free ends of the bars to take the punches, which are held by means of set screws. To hold the punches at the desired spacing, a slotted clamping device is bolted across the bars as shown, a spacing washer being used between the clamping piece and the lower bar to keep the bars in alignment.

Grooved Pistons for Outboard Motors

Following the practice of some auto race drivers, outboard motorboat racers have adopted oil-grooved pistons. The problem of proper piston lubrication in an outboard racing motor is a serious one, due largely to the extremely high speeds attained. At this speed, good piston lubrication is essential to prevent "freezing" and melting of the piston heads. The grooves are cut around both ends of the piston and connected by a spiral groove.

The Next Issue

WHAT YOU CAN DO IN REWINDING MOTORS

Practical information that tells just what the average amateur can do in rewinding burned-out electric motors and restoring them to running condition.

SOMETHING NEW IN MASQUERADE COSTUMES

Striking disguises for masquerade parties; an imitation robot that creates a sensation, a human alarm clock and others equally fascinating.

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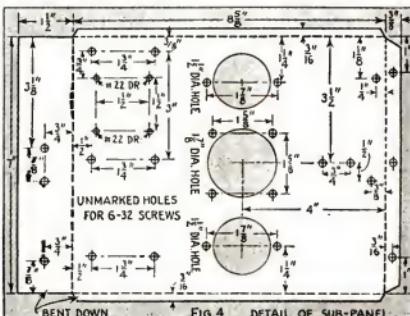
L. L. BEAN, Mfr.
432 Main St.
Freeport, Maine

BEGINNERS' TWO-TUBER FOR SHORT WAVES

(Continued from page 583)

1½ in. long may be mounted under the base to obtain the same results, if desired.

The three small holes in the front panel should line up with three similar holes in the front end of the base as the dial covers the center hole. A flat-head screw and countersunk hole should be provided for the center. The tuning condenser C₁, phone jack, 50,000-ohm variable resistor R₁, dial and pilot light are mounted on the front



panel. The dial is fastened by small screws through the back. The rotor plates of the condenser are moved out as far as they will go, the dial is then set at zero, and the setscrew tightened. The twisted wires for the dial light are connected across the heater terminals of the socket.

Fig. 3 shows the arrangement of the various parts on, and below, the base. All fixed condensers, resistors and r.f. choke are provided with pigtailed leads which are easily soldered in position under the base. A complete material list of the standard parts used, and further operating data, may be obtained upon application without charge. The antenna and ground binding-post strip are mounted on the rear

(Continued to page 116A)



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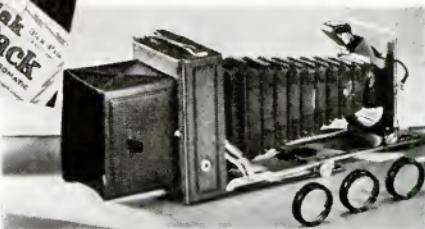
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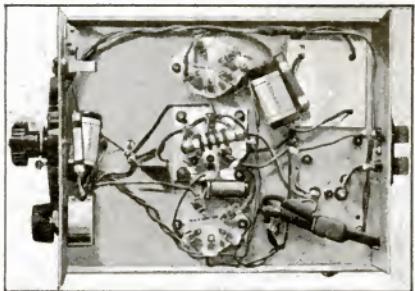
IF IT ISN'T AN EASTMAN, IT ISN'T A KODAK

F.M. 10-44

BEGINNERS' TWO-TUBER FOR SHORT WAVES

(Continued from page 114A)

of the base. The antenna post is insulated, and the ground connection to the base is made on the No. 2 terminal of the coil socket. This common ground connection can be taken to a soldering lug on any convenient mounting screw; another common grounding point is on the mounting screw of the tuning condenser, the rotor



Underside View of Completed Short-Wave Receiver

plates of which are grounded to the frame. An enlarged blueprint of all wiring diagrams is available; those who wish it should specify blueprint No. 201. Five color-coded National plug-in coils are used to cover all wavebands from 13.5 to 200 meters. The B-batteries are connected in series to the two flexible leads soldered to the terminals indicated on the audio transformer. If there are any points not clear to the reader the radio editor will be glad to explain them in further detail.

GENERAL-PURPOSE AMPLIFIER USES RECEIVING TUBES

(Continued from page 584)

19 in. wide and 27 in. high. The amplifier unit has a main volume control in the grid circuit of the type-56 tube. Type-2A5 tubes are employed in the driver and push-pull output stages; these are of a sturdy variety that will withstand any reasonable amount of mechanical vibration. Simplified wiring diagrams of each unit, together with the schematic diagram shown, are available in blueprint form; if desired specify blueprint No. 202. As the amplifier is operated with a fixed bias, this can be obtained easily with small C-batteries.

FOG STILL CHALLENGES INVENTORS

(Continued from page 523)

Red neon lights have been used with some success to aid aviators in fog, for the red rays will penetrate farther than the longer white and blue rays, and by eliminating the glare of these longer rays the source of the red light is apparent at greater distances. Fog usually comes in comparatively thin layers, so a light on the ground that might easily be seen by an airplane pilot through a 200-foot layer of fog would not be strong enough to prevent a collision at sea. The lighthouse service is now installing yellow sodium vapor lamps in lighthouses and ships. These are superior to the white lights but are quite inadequate to pierce a fog at sea.

With lights unable to give the desired visibility, there still remains a challenge to inventors to develop some way of dissipating fog. Tests have shown that this is quite possible, but up to now impractical.

In 1921, three scientists equipped an army airplane with a sand hopper and a device for charging this sand with electricity. Flying over a rather light cloud, they sprayed their sand upon it, and in a few minutes the cloud had disappeared. With the sand all gone the pilot then flew through a similar cloud and it likewise disappeared. When the men had descended it was noticed that clouds not tampered with at all were likewise breaking up, so the test became meaningless.

Subsequent tests have shown that ionized particles such as sand, dust and water vapor, really are capable of cutting a swath in a cloud but it would take nearly a ton of these particles a minute to keep an acre of surface clear of a wet fog 300 feet deep—an entirely impractical operation. A Harvard professor suggested that fireboats discharge electrified water into the air to clear a harbor of fog. These electrified streams of water really would dissipate any fog, but it would close in immediately.

Heat would also dissipate fog, but Professor Humphreys' figures show that it would take 140 tons of coal every minute for each square mile, even if this test could be evenly distributed over the area without loss.

The challenge of fog is still open and a fortune awaits the one who can meet it.



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The new 9-inch swing "WORKSHOP" Lathe shown above is a Back-Geared Screw Cutting Metal Working Lathe and will handle all general metal working operations, such as turning, facing, drilling, boring, reaming, cutting-off, knurling and screw-thread cutting. Also recommended for wood turning, for machining compositions, etc. This lathe is a genuine South Bend Lathe and is used in repair shops, home workshops, auto service shops, electrical shops, laboratories, model making, manufacturing production, vocational schools. Hundreds are now in use all over the World.

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The "WORKSHOP" Lathe will cut standard screw threads, right and left-hand, from $\frac{1}{4}$ to 40 per inch, including 11 $\frac{1}{2}$ pipe thread. The power of the lathe is remarkable, being capable of reducing the diameter of a steel shaft $\frac{1}{4}$ " in one cut. The 3' bed size Lathe takes 18" between centers. Lathe is also available with 3 $\frac{1}{2}$ " and 4' beds. The 9" x 3 $\frac{1}{2}$ " Motor Driven Lathe is the most practical and most popular size. Countershaft Drive and Motor Drive Models in floor leg and bench leg types are available in 20 different combinations to suit every need.

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South Bend Back-Geared, Screw Cutting Precision Lathes are built in 96 other sizes and types from 9" to 36" swing, with countershaft drive and with individual motor drive, price range \$108 to \$1500.

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b813 A MILLION DOLLAR HOBBY

(Continued from page 554)

bought at a post office with no thought of collecting. Being stamp-wise, however, he knew this error in the stamp meant money. A dealer paid him \$10,000 for the sheet, and later a collector paid \$20,000 for it. Eventually the sheet was broken up in blocks, one of which, consisting of four, was sold for \$12,000.

Rubbish piles of old papers have a strong fascination for the stamp collector, and for good reason. Once, a buyer of scrap paper saw a pile of old letters, books and other papers on the floor of a banking firm which was vacating the premises. He paid \$15 for the lot. On examining the "rubbish" he found, besides autographs of famous men, hundreds of cancelled and unused stamps worth more than \$75,000.

In the United States, the post office department reports that \$1,800,000 was realized from the sale of stamps to collectors during the fiscal year ending June 30. About \$800,000 of this went for commemorative issues sold through the Philatelic division, a branch of the post office established in 1921 for the sole purpose of catering to stamp collectors.

Collectors have paid, and with pleasure, for stamps of Mexico for the financing of a war on grasshoppers and locusts; stamps of Ecuador for the building of post offices; stamps of Portugal for the rearing of a monument to a national hero; stamps of Austria to promote athletics, and stamps of Belgium for the benefit of flood sufferers.

Where lies the lure of stamp collecting? Veterans at the hobby stress the fun and knowledge to be found in it, pointing out that not only does it include the study of geography, customs, history, government, literature and languages of various countries, but that it leads to familiarity with color nomenclature, engraving and printing methods, and associated fields.

Collections have been started with nothing more than a cheap album and a few stamps, but experts agree that in the long run it is best to start with the proper equipment. A prominent stamp dealer who has had many years experience in steering beginners on the right road, advises those embarking on a stamp-collecting career to pick one dealer and stick to him. Membership in a stamp club, of which there are many in this country, is worth while.



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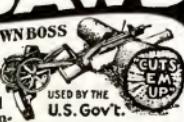


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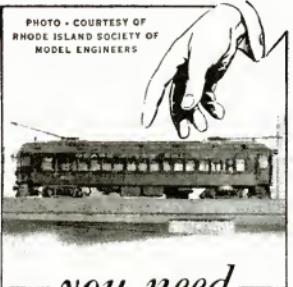
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THINGS THAT LIGHTNING DOES AND DOESN'T

(Continued from page 548)

until a century or so ago. These rings are now known to be due to the growth of fungus colonies, which start at a central point and gradually spread outward. A real effect of lightning is seen in the large roundish patches of dead and injured vegetation sometimes found after thunderstorms in fields of growing crops.

Lightning frequently imprints upon the bodies of persons struck by it, with or without fatal results, ramifying pink marks, which generally fade in a few days if the victim recovers. The marks are merely burns produced by a branching electrical discharge passing through the tissues.

The effects of lightning on the object it strikes are sometimes very conspicuous and at other times quite the reverse; the difference depending mainly on the degree of resistance encountered by the discharge.

When lightning enters a house it sometimes takes a strange and devious course, which can subsequently be traced by its visible effects. A case of this kind was reported a few months ago in England. The flash struck a chimney, and deviated to the head of an iron bedstead in an upper room, upon which two boys were lying, followed the iron frame underneath the bed, setting the bedding on fire, but without injuring the occupants, descended the further leg of the bedstead, making a hole in the floor into which one's finger could be inserted, and penetrating to the room below. There it traveled straight downward in the corner until half-way to the floor, when it turned sharply at right angles and passed horizontally along the wall to the next corner, making a blackened score in the wall paper. Again it pierced a hole, big enough to put a finger into, through the wall into a larder behind, fused together some cake tins which lay on a shelf, fitted one inside the other, and then it passed through the open door of the larder, across the kitchen and out through the open entrance door of the cottage. In the kitchen four persons were seated around a square table at supper. The flash passed across the table and burned to a blackened cinder a piece of ham which was on a dish in the center, and on which lay the carving knife and fork, again no one was injured.



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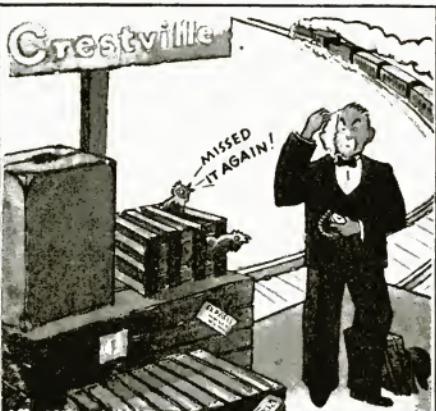
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THRILLS OF FLYING THE MAIL

(Continued from page 565)

and marked every few miles by 2,000,000-candlepower revolving beacons.

Nearly a decade ago an air-mail pilot started out over a barren country on his regular run to a city 200 miles distant. He failed to arrive and overdue minutes dragged into overdue hours. Searching parties failed to find him. Two days later he arrived at an isolated ranch house with his mail, cold, hungry and exhausted. A leaking gas line forced him down and a snowstorm camouflaged his plane so searching ships passed it by. A pilot in difficulty today reports his position by radio and those going to his assistance know exactly where to look.

Another mail flyer was breezing along between New York and Washington one night when he saw a mountain looming up where no mountain ever had been before. He knew it could not be real and determined to keep on his course. At the last minute he decided perhaps there had been an earthquake and a mountain had bobbed up overnight, so he zoomed over. After he passed, he looked back. The "mountain" was a giant dirigible, head on and at such an angle that its lights did not show. Today radio would have warned him the dirigible was in his vicinity.

One of the hazards feared by mail flyers before adequate weather reports and audible radio beacon signals minimized the danger was being caught far above the earth with a blanket of fog between the plane and any possibility of landing. A few years ago a pilot flying from Cleveland to New York came through a pass in the Alleghenies and found it necessary to climb above fog and rain to get out of the mountains.

At last he saw an opening in the clouds and down he came over the Susquehanna river to find clouds only about 200 feet above the water. Then began a zigzag trip downstream between the high banks of the narrow river at a speed of 100 miles an hour and with a visibility of about 100 yards. Finally he found an opening through which he could climb and continued on.

For the early flyers, such experiences were all in the day's work, but the dangers they faced helped to build up the air-mail service to a standard of efficiency where it has come to be taken for granted.

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VICTOR SOAP CO., Dept. PM-104, DAYTON, OHIO

THE GADGET KING OF AMERICA

(Continued from page 539)

square inch. For perfect balance and so they wouldn't oscillate at 7,500 revolutions, the shafts were ground to a diameter accurate to a half-thousandth of an inch.

Wood is equally enthusiastic about the success of the boat's step—the secret to the application of the world record-holder's 6,400 horsepower.

"There is a point at which a hydroplane makes her best speed," he said. "We call it the point of oscillation. In practice runs, when Miss America began to oscillate we knew that a point just this side of oscillation was her best speed. We knew that if we couldn't feed her the revolutions we knew she had to take without getting that oscillation, her step needed adjustment. The step was designed to be variable by putting a duralumin plate across the full width of the step with shims between.

"The first time we took her out the angle of the step was too great to permit the expected speed. We knew that quickly because the bow rode high, even before oscillation was felt. We took out half an inch of shims. Then we went out again, and found we had taken out too much. We kept on experimenting until we had her running along absolutely even."

Finally the subject of a new Miss America was broached.

"We don't need a new boat yet," Wood said, "but when we do we'll have one. And if you think this boat is fast we'll be able to show you something. We've been thinking about it for a long time. It won't be the huge boat the Tenth is. The motors will be much smaller and so will the hull. But boy, it will be fast!"

Gar ran his fingers through his heavy shock of silver hair. Eyes twinkling but with a note of seriousness in his voice, he added:

"But before we race it we'll have to do a lot of work on blueprints, hold a whole lot of laboratory tests and do plenty of practical experimenting. The new one won't be a gadget, or a collection of them, any more than is the Miss America X."

Names and addresses of manufacturers and dealers in articles described, and any other details in our possession, will be furnished by our Bureau of Information upon request, accompanied by postage.

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THE MIRACLE OF LIGHT

(Continued from Roto Section)

candlepower each and 575 underwater floodlight projectors.

As for colors, even the casual observer notices a vast difference between this year's color scheme and last year's. Last year twenty-five brilliant hues of paint adorned the buildings. This year the number has been reduced to eight, exclusive of black and white. Thirty per cent of the paint this year is white, with green, red and blue following in order. But that is not all. This year the grounds were divided into areas and seldom are more than three principal colors employed in any single area. The reason for the change is explained by Shepard Vogelgesang, the color expert.

"We found," he said, "that it is seldom effective to combine more than three really separate colors because people become confused. That's something to remember when decorating your home. The eye does not study each shade of color separately, but takes them as a group. And the eye does not recognize more than about three colors at a time. So we have a dominant color for each area with different vistas to accentuate the color schemes."

The Fair has employed gaseous tubes for extensive floodlighting for the first time. In combination with paints of many hues, these tubes give whole towers and broad surfaces a jewel-like glow. Paints which have a fluorescence under night lights also were developed, offering a weird radiance which often changes the entire appearance of a building at night.

Relief, outline and decorative lighting is accomplished with the gaseous tubes. Neon gas in red tubes gives a ruby color, krypton in a clear glass shell makes a violet blue, helium in a yellow shell shows yellow and krypton in a green bulb offers emerald hues. The use of hot-cathode tubes for lighting at the Fair shows their vast possibilities in the future floodlighting of buildings in color. The tower of the Hall of Science with its gaseous conductor tubes in colors is an example of this form of illumination.

"Lighting the Fair," modestly proclaims J. L. McConnell, the lighting engineer in charge, "was simply a matter of superimposing colored lights on colored surfaces.

(Continued to page 128A)

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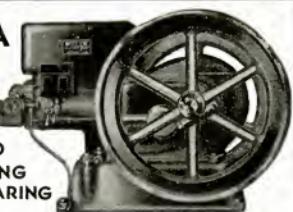


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THE MIRACLE OF LIGHT

(Continued from page 126A)

The man or woman with some artistic ability can duplicate some of the color effects we obtain in the home or garden."

Lighting is mostly a game of hide and seek when used for decorative purposes. It is a matter of throwing the light on the surface to be illuminated without revealing its source. Examples of this can be found everywhere at the Fair. Light sources are hidden in troughs and recesses or screened with translucent material and certain areas difficult to reach are illuminated by inconspicuous floodlights and searchlights atop the towers of the 600-foot Sky Ride. Flowers are used more extensively than last year to lend color by day, and by night the flower beds are lighted by mushroom lamps on short standards. The light from these sources, while not concealed, is indirect and gives the visitor the impression of walking waist deep in a diffused radiance—certainly an idea worth considering for the home flower plot.

The amateur will require practice to blend the proper lights with the proper colors unless he has marked artistic ability, but he will find that a white surface is safe to begin with. It also will not take him long to discover the Fair's secret of changing purple-red surfaces to flame color at night. They simply turn a red light on the blue. In like manner green light changes light blue buildings to green at night.

Lighting of paths, walks and bridges at the Fair also may point to a new method of street illumination for the future. Some of these lamps are simply translucent cylinders mounted on lattice masts, others are indirect luminaires and still others are sea-shell reflectors or "telegraph-pole" standards. The latter are tubular lamps projecting horizontally from the tops of steel poles. These lamps are of the vacuum type and give a diffused glow without glare, being suitable for outdoor service.

One of the most spectacular lighting effects is seen in the lagoon fountain, 810 feet long, which combines electric lighting and color in a manner never before attempted. There are no statues or other art work as a part of the fountain. It depends entirely on water and light for its appearance. Its flow of water, 68,000 gallons per minute, several times as much as

(Continued to page 130A)

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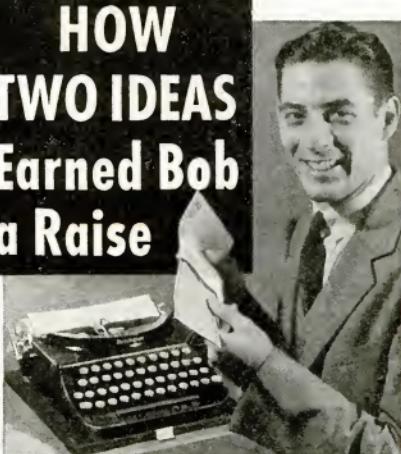
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THE MIRACLE OF LIGHT

(Continued from page 128A)

the next largest fountain in the world, and enough to supply a city of 1,000,000 people, is illuminated with concealed floodlights of changing color. The fountain, the floodlights and the bank of searchlights use enough electricity to supply a city of 150,000 population. Underwater floodlights for this fountain are not water-tight, the water being allowed to play over them and keep them cool, a revolutionary procedure in water illumination.

Another remarkable effect never before attempted is the neon Niagara which cascades down the front of the Electrical building. This is produced by using illuminated gas tubes for the waterfall while searchlights behind it create an artificial Aurora Borealis.

Louis Skidmore, assistant general manager in charge of design and construction, believes the lights and colors of the Fair will be reflected in the homes and gardens a few years hence.

"Every fair has left its architectural imprint on succeeding generations," he observed. "This Fair has shown people how color and light can be employed successfully for decorative purposes. Why should a big office building remain a dirty gray for the forty or fifty years of its useful life when it can be given a fresh face as often as desired with the use of light and color? Why should the four walls of a room be painted one solid color without regard to the diffusion of light or the decorative possibilities?"

Mr. Vogelgesang, the color expert, visions rooms with surfaces which do not seem to hold the occupants to the confines of four walls.

"We know new lighting effects to produce if we had the materials with which to work," he says. "With the proper materials illuminated in the proper manner, we should like to produce walls with no wall feeling. We know how to produce the lighting effects but not how to increase the area affected by light to larger proportions than in present use at the Fair. The nearest we have come to it is a wall of polished black glass which can be so illuminated that it does not appear to be a confining wall but seems like a black void in which shimmer flecks of color like constellations in space."

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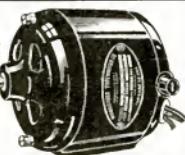
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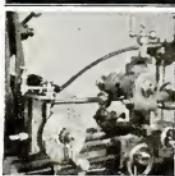
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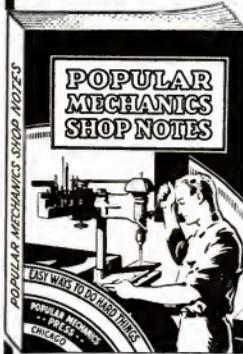
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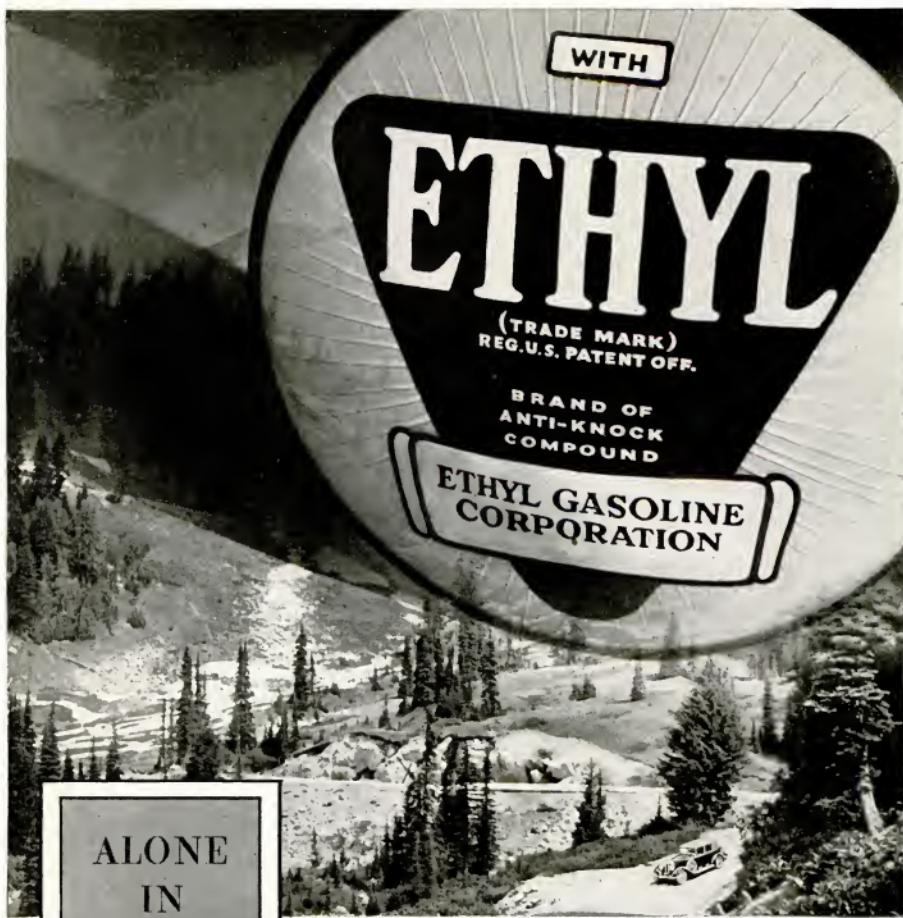
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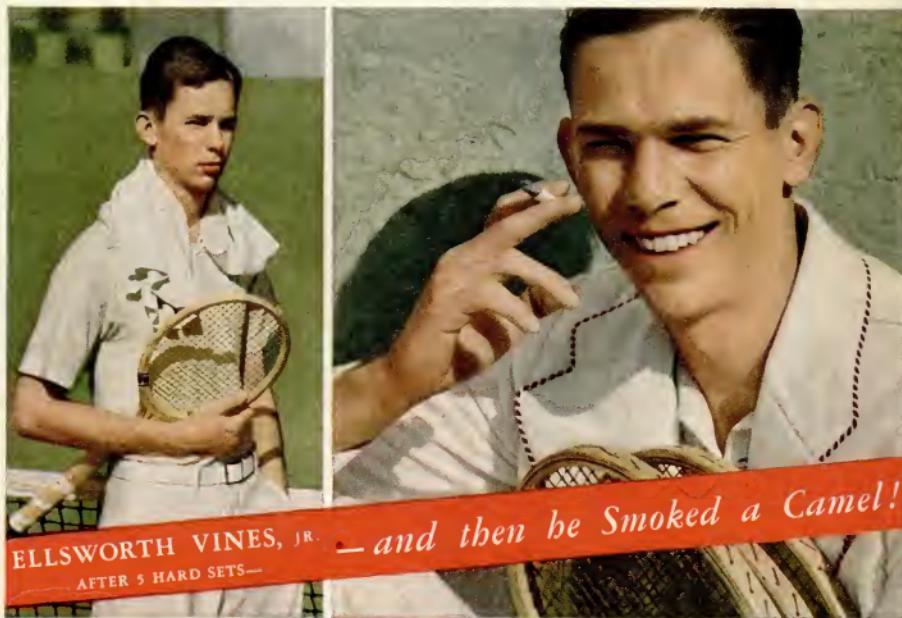


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